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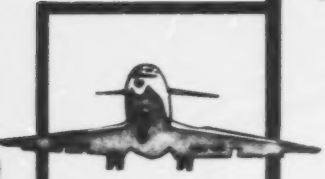

NATIONAL TRANSPORTATION SAFETY BOARD

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WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

VIEQUES AIR LINK, INC.,
BRITTEN-NORMAN BN-2A-6 ISLANDER, N589SA
VIEQUES, PUERTO RICO
AUGUST 2, 1984

ORIGINAL

NTSB/AAR-85/08

UNITED STATES GOVERNMENT

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16. Abstract About 0805 Atlantic standard time on August 2, 1984, Vieques Air Link, Inc., Flight 901A, a Britten-Norman BN-2A-6 Islander, crashed into the ocean shortly after takeoff from Vieques, Puerto Rico. Flight 901A was operated from Vieques, Puerto Rico, to St. Croix, U.S. Virgin Islands. The pilot and his eight passengers were killed, and the airplane was destroyed on impact with the water. The investigation revealed that the left engine lost power shortly after takeoff and that the pilot lost control of the airplane.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the pilot to execute the emergency engine-out procedure properly shortly after takeoff following a loss of power in the left engine because of water in the airplane's fuel system and the failure of the Puerto Rico Ports Authority to remove excess water known to be in the airport's in-ground fuel tank before conducting fueling operations. The pilot's failure to execute the engine-out procedure properly was due to his inexperience in multi-engine airplanes.

Contributing to the accident were: (1) the air carrier's use of a pilot not certificated for the flight; (2) the air carrier's failure to train the pilot adequately; (3) the pilot's failure to follow proper practices to detect water in the airplane's fuel tanks; (4) the out of weight and balance condition of the airplane; (5) the Federal Aviation Administration's (FAA) incorrect application of 14 CFR Part 135 Rules to commuter air carriers; and (6) the FAA's generally inadequate surveillance of the air carrier.

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

Adopted: September 27, 1985

VIEQUES AIR LINK, INC.
BRITTEN-NORMAN BN-2A-6 ISLANDER, N589SA
VIEQUES, PUERTO RICO
AUGUST 2, 1984

SYNOPSIS

About 0805 Atlantic standard time on August 2, 1984, Vieques Air Link, Inc., Flight 901A, a Britten-Norman BN-2A-6 Islander, crashed into the ocean shortly after takeoff from Vieques, Puerto Rico. Flight 901A was destined for St. Croix, U.S. Virgin Islands. The pilot and his eight passengers were killed, and the airplane was destroyed on impact with the water. The investigation revealed that the left engine lost power shortly after takeoff and that the pilot lost control of the airplane.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the pilot to execute the emergency engine-out procedure properly shortly after takeoff following a loss of power in the left engine because of water in the airplane's fuel system and the failure of the Puerto Rico Ports Authority to remove excess water known to be in the airport's in-ground fuel tank before conducting fueling operations. The pilot's failure to execute the engine-out procedure properly was due to his inexperience in multi-engine airplanes.

Contributing to the accident were: (1) the air carrier's use of a pilot not certificated for the flight; (2) the air carrier's failure to train the pilot adequately; (3) the pilot's failure to follow proper practices to detect water in the airplane's fuel tanks; (4) the out of weight and balance condition of the airplane; (5) the Federal Aviation Administration's (FAA) incorrect application of 14 CFR Part 135 Rules to commuter air carriers; and (6) the FAA's generally inadequate surveillance of the air carrier.

1. FACTUAL INFORMATION

1.1 History of the Flight

On August 2, 1984, a Vieques Air Link, Inc., (VAL) Britten-Norman BN-2A-6 Islander, N589SA, was operated as an extra section 1/ to Flight 901. Flight 901 was regularly scheduled to depart Vieques, Puerto Rico, at 0730 and arrive at St. Croix, U.S. Virgin Islands, at 0800; however, the company cancelled Flight 901 and substituted Flight 901A, the extra section flight, in its place. The VAL counter agent on duty "designated" Flight 901A as an extra section which he considered to be an on-demand 2/

1/ An additional commuter flight added to the schedule when the number of passengers exceeds the capacity of the scheduled flight.
2/ An operation conducted by an operator when an individual or group hires the air transportation services of a company at any particular time.

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operation. The pilot had reported for duty at Vieques at 0630. 3/ At 0705, he flew N589SA to Fajardo, Puerto Rico, with nine passengers aboard and returned to Vieques at 0736 with three passengers. The company designated the flights to and from Fajardo as an on-demand and a charter flight, respectively. The regularly scheduled commuter flights, Flights 301 and 302 to and from Fajardo on August 2, 1984, were operated on time.

About 0745, after deplaning passengers in Vieques, the pilot taxied N589SA to the gas pump where 30 U.S. gallons of 100/130 octane low lead fuel were added to each wing tank. The Puerto Rico Ports Authority (PRPA) fueler did not remember if the pilot drained the fuel tank sumps of the airplane, and no witnesses were found who saw the pilot check for water in the fuel tanks or drain the sumps.

Flight 901A departed the ramp in Vieques about 0755 with eight passengers aboard, all of whom had reserved seats and purchased tickets for Flight 901. The pilot of Flight 901A contacted the UNICOM 4/ as he taxied out to the takeoff end of runway 9. The UNICOM operator informed him that there was no other traffic in the area. According to a mechanic at the airport, after takeoff, the airplane appeared to climb out normally; however, he said that as the airplane turned left in a crosswind departure pattern, it appeared to lose power when about 200 feet 5/ above the ocean. He stated that the airplane then gained about 50 feet, while in a nose-high attitude, and that he then heard the engines develop more power, before the plane descended into the ocean. The airplane had crashed into the ocean north of the departure end of runway 9 and about 1/2 mile off shore.

Another mechanic who witnessed the accident stated that the airplane oscillated longitudinally about its lateral axis for a few cycles, and that after regaining some of its lost altitude, it banked abruptly to the left. As the angle of bank increased, the nose dropped and the airplane hit the water left wing low. A pilot who was flying overhead and observed the crash stated that the airplane wreckage floated for 2 to 3 minutes. He made three passes over the wreckage and saw no survivors. Fishermen, alerted by radio, rushed to the scene by boat and found that the airplane had sunk in about 18 feet of water. Fishermen in scuba diving equipment dived to the airplane and brought up the bodies to waiting boats.

According to testimony, about 0645 a ramp inspector for the PRPA drained the gasoline pump filter and tested the fuel storage tanks in the airport fuel storage facility for water. He said that the No. 2 tank indicated 1 1/2 inches of water and that he notified the airport manager of the water depth. The 1 1/2 inches of water was 1 inch higher than it had been on the previous day and this water depth was the highest it had been in the recent recorded past. The previous average water depth had been only 1/2 inch.

After the ramp inspector reported the presence of 1 1/2 inches of water existed, but before the water was pumped from the No. 2 tank, VAL's Mk III Trislander was fueled with 12 U.S. gallons (6 gallons in each wing tank). The ramp inspector refueled

3/ All times herein are Atlantic standard time, based on the 24-hour clock.
4/ Common VHF radio frequency of 122.8 MHz operated by duty personnel of the Puerto Rico Ports Authority who are located in the Vieques airport terminal.
5/ All altitudes are mean sea level unless otherwise noted.

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the Mk-III Trislander before pumping the water from the tank because he believed that the gas pump would not suck up water if only a few inches of water was indicated, especially when such a small amount of gasoline was to be pumped.

About 0730, another PRPA employee, the Vieques terminal custodian, arrived for duty. He observed the ramp inspector fueling the Mk III Trislander, N624BN. After it was refueled, according to the testimony of both PRPA employees, they pumped the No. 2 tank to remove the water. No transparent receptacle was used to observe water content either before or after the pumping operation. The terminal custodian said he retested for water in the storage tank after the pumping. He did not say how much water, if any, remained after he performed the test. He then went to the terminal building to begin his cleaning duties. About 0740, he returned to the gas pump and fueled the accident airplane.

The terminal custodian said that when he saw the airplane crash, he dropped his mop and ran toward the beach. When he was halfway down the runway, he noted that another VAL airplane, N290VL, had landed and would require fuel. He changed his direction and proceeded to the gas pump. He refueled the airplane, reportedly the third airplane to be refueled that morning from the PRPA No. 2 tank.

He estimated the refueling time to be between 0800 and 0820. N290VL did not fly again until 1540. Islander N197BN and N588JA were refueled after the "second pumping" of the tank.

About 0826, the Mk III Trislander, N654BN, returned from Fajardo, Puerto Rico. About 0905, a pilot for the Puerto Rico Fire Service, accompanied by an employee of the Puerto Rico Police Department, landed at Vieques in a Piper PA-23 Aztec. About 0930, as the Fire Service pilot and the Police department pilot were leaving the terminal, they observed pumping activity at the fuel storage area. The two pilots went across the ramp to the fuel storage area where they observed two PRPA employees pumping liquid from the storage tank and dumping it onto the concrete ramp. The VAL company president was present, and he put his cupped hand into the liquid coming from the pump. According to his testimony, he said, "Hey, this is water and mud." A PRPA employee stated that what was seen by the company president was sediment from the floor of the tank which was stirred up by the suction hose. The PRPA employee claimed to have seen only sediment and no water. The Fire Service pilot said that the liquid was pumped for about 20 to 25 minutes. He described the pumped liquid as being "all over the place." The quantity of liquid pumped was estimated to have been about 250 gallons.

About 1000, an insurance broker for VAL arrived. He and VAL's president drained fuel from the right tank of the Mk III Trislander onto his hand. He claimed that the liquid that came out of the drain was water. The Mk III Trislander pilot said that he had drained the sumps after the refueling earlier that morning. He did not say how much water, if any, came from the sump drains.

About 1100, an FAA Principal Maintenance Inspector, the company president, the director of maintenance, and the insurance broker returned to the Mk III Trislander and drained fuel from both tanks into two bottles, which were retained for analysis.

The accident occurred during daylight hours at latitude 18°08'40" north and 65°29'30" west.

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1.2 Injuries to Persons

Injuries	Crew	Passengers	Others	Total
Fatal	1	8	0	9
Serious	0	0	0	0
Minor/None	0	0	0	0
Total	1	8	0	9

1.3 Damage to Aircraft

The airplane was destroyed upon impact with the sea.

1.4 Other Damage

None.

1.5 Personnel Information

The pilot held a commercial pilot certificate and a second class medical certificate. He was not qualified to fly as pilot-in-command of a commuter air carrier flight or as pilot-in-command of an extra section of a commuter air carrier flight. He was qualified to fly on-demand flights.

VAL's training program and training manual were approved by the FAA as part of VAL's operating certificate. The Safety Board examined the pilot's individual training records obtained from VAL's operations department.

He was issued a student pilot's certificate on July 9, 1981, and a private pilot's certificate on October 21, 1981. He enrolled in the Bolivar Pilot School, Bolivar, Tennessee, on February 22, 1984, for the commercial pilot's certificate and instrument rating courses, as well as a multi-engine rating. He graduated on March 13, 1984, upon successful completion of the required FAA flight tests for the commercial, instrument, and multi-engine ratings.

According to his ground training records, the pilot received over 52 hours of ground school between February 22 and March 6, 1984. He was credited with 50 hours of ground training on the basis of previous ground training and because he had passed the FAA commercial pilot's written examination before enrolling in the school.

The pilot's flight record from the Bolivar Pilot School indicated that he had received 66.1 hours of dual instruction in the Cessna 150 and the Cessna 172RG toward the commercial and instrument ratings, and 6 hours in the Piper PA-30 Twin Commanche toward the multi-engine rating. Of these 72.1 hours, 6.5 hours were nighttime dual instruction and 10.8 hours were cross-country dual instruction. The instrument training consisted of the following:

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Type	Hours
GAT-1 Link Trainer 6/	17.1
Hood 7/ time in an airplane	23.7
Actual instrument time	0.5
Total	41.3

The pilot's individual pilot training record indicated the following:

Type of Aircraft	Date of Qualification
BN-2A (Mk III)	March 18, 1984
PA-32-260	April 22, 1984
BN-2A-6	May 13, 1984

VAL's training record's indicated that the pilot was provided 6 hours of initial ground training on the BN-2A (Mk III) Trislander, a 2-hour training flight in maneuvers and procedures, and a 1-hour initial first officer competency flight check in the BN-2A Mk III-Trislander on March 18, 1984; however, the maintenance and flight log sheet contained no entry for the 2-hour maneuvers and procedures training flight or of an airport and route qualification flight on March 18, 1984.

Initial ground training on the PA-32-260 Cherokee was given by VAL on April 21 and 22, 1984. The training record showed that the pilot received 11.5 hours of ground training, and a 1-hour flight check on these dates.

According to VAL pilot training records, initial ground training on the BN- 2A was provided to the pilot on May 3 and 4, 1984, and he was given a 1-hour check flight on May 13, 1984. Also, according to a note in the "remarks" section of the Certificate of Proficiency (FAA Form 8410.3), the pilot was restricted to flying on-demand air taxi flights in the BN-2A in accordance with 14 CFR Part 135.243.

Each VAL pilot was responsible for submitting his flight time records to management at the end of each month. It also was a pilot's responsibility to complete entries in the maintenance and flight airplane log sheet for each leg of each flight. These procedures were VAL's FAA approved methods for complying with the recordkeeping requirements of 14 CFR Part 135. The accident pilot had not submitted monthly duty and flying times for March or July 1984. On March 18, 1984, when the pilot was employed by VAL, he claimed to have 510 hours of single-engine experience. In April 1984, the pilot claimed on a VAL insurance pilot history form to have 1,085 hours total flying time, and 400 hours of pilot-in-command experience in multi-engine airplanes. He listed his total flying time in BN-2A airplanes as 480 hours but he did not qualify in the BN-2A at VAL until May 13, 1984. Because of these omissions and ambiguities, the Safety board used maintenance and flight log sheets and PRPA log sheets to reconstruct the pilot's flying experience. With the information available, the Safety Board was able to determine that the pilot had the following experience at the time of the accident:

6/ An inexpensive trainer that simulates the typical performance of a light, single engine airplane, such as the Cessna 150 or the Piper Cherokee which was manufactured by Singer in Binghamton, New York. It incorporates motion about the pitch, roll and yaw axes, and all primary flight instruments indicators.

7/ A device placed over the pilot's field of view to preclude reference to cues outside the cockpit while simulating instrument conditions.

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Total Time

Airplane/Source	Pilot-In Command	Second-In Command	Total
Prior to Employment	-	-	516
BN-2A Islander	53	18	71
BN-2A MK III (Trislander)	86	19	105
PA-32 Cherokee	31	-	31
Total			723

Multi-Engine Time

Bolivar School	6	-	6
BN-2A Islander	53	18	71
BN-2A MK III Trislander	86	19	105
Total			182

1.6 Aircraft Information

The airplane was certificated in accordance with applicable FAA regulations and was maintained in accordance with its Approved Airplane Inspection Program, which included four major inspections--an "A" inspection at 50 hours, a "B" inspection at 100 hours, a "C" inspection at 500 hours, and a "D" inspection at 1,000 hours. Inspections are to be conducted in sequence at 50-hour intervals. VAL had owned and operated the airplane for about 1 year; it had 5,703 hours of total in-service time.

The Britten-Norman BN-2A-6 Islander is a high-wing, fixed-landing gear airplane certificated under 14 CFR Part 23. It is powered by two AVCO Lycoming Model O-540-E4C5 six-cylinder, normally aspirated reciprocating engines, each of which develops 260 shaft horsepower. The maximum takeoff gross weight authorized for N589SA was 6,000 lbs, and the range of its center of gravity (c.g.) at that gross weight was from 21.0 inches to 25.6 inches. At a lesser gross weight of 5,000 lbs, the airplane's c.g. limits were from 17.0 inches to 25.6 inches.

The accident airplane was fitted with 10 seats, including 2 forward for the pilot and copilot. The copilot's seat was used as a passenger seat. The airplane had three cabin compartment access doors: two on the left side of the fuselage, and one on the right side of the fuselage. The cargo/baggage compartment was located behind seat row 4; a cargo net separated the compartment from seat row 4.

A weight and balance manifest, which reportedly was prepared by the VAL counter agent at Vieques prior to the departure of Flight 901A, was provided to Safety Board investigators 2 days after the accident. It listed passenger seating by row numbers, passenger weights, fuel weight, baggage weight, and other information. The passenger weights used for the weight and balance manifest were those given verbally by the passengers to the VAL counter agent; none were actually weighed. This practice was in accordance with VAL's FAA-approved operating specifications. No VAL ground employee witnessed the boarding of passengers.

A second manifest was provided to Safety Board investigators by FAA representatives at a later date. That manifest was obtained from VAL by the FAA as part of its separate investigation of the accident to ascertain regulatory compliance. With the

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exception of the location/weight/moment of the pilot, the details of that manifest were significantly different from the one originally presented to the Safety Board. Seven of the 8 passengers were listed in different seat locations. Also, the listed passenger weights were significantly different, as were the fuel and baggage weights.

Table 1 depicts the airplane weight and balance information as derived from the two flight manifests (columns I and III) and from postaccident evidence, including "estimated" weights reported by the coroner at autopsy (column II).

The takeoff gross weight (TOGW) of the airplane and the center of gravity (CG) on both manifests were within specified limits. The total weight difference between the weights used on the weight and balance manifest initially obtained by the Safety Board and the coroner's estimated weights was 85 pounds. The largest variation was 50 pounds for a man whose weight was listed as 200 pounds, when the coroner's estimated weight was 250 pounds. The weight of a boy sitting in an aft seat was listed by VAL as 130 pounds, but was estimated by the coroner to have been about 85 pounds. The baggage weight of 163 pounds was used for the calculations because the VAL counter agent stated during testimony that he remembered that there were 163 pounds of baggage on the flight.

Considering all the evidence collected, including data from the second manifest, column IV represents the most probable passenger, baggage and fuel weight configuration of the accident airplane. This configuration includes about 250 to 300 pounds of fruit (mangos) that reportedly were on the airplane, about 250 to 300 pounds of suitcases which reportedly were aboard and no passenger in the front-righthand seat. Based upon the fuel quantity at the start of the day, fuel burn rate, and fuel added prior to takeoff, an initial fuel weight of 660 pounds was used in calculating the most probable weight and CG conditions. These conditions put the airplane about 740 pounds over TOGW and its CG about 5 inches aft of its rear limit.

A recalculation of the weight and balance using the coroner's estimated weights, the 163 pounds of baggage, and the seating position of each passenger, as indicated on the first manifest, (column II) put the actual takeoff weight of the airplane at 6,123 pounds, which was 123 pounds over the maximum allowable takeoff weight. The airplane CG was calculated to be 23.2 inches--within limits.

The manufacturer provided performance data using the calculated TOGW and CG data for the most probable loading condition (column IV). The stall speeds for a BN-2A under the meteorological conditions on the day of the accident and for the most probable loading condition were:

Flap Position	Stall Speed
Retracted	50.5 KIAS
25 degrees	43.5 KIAS
56 degrees	40.0 KIAS

The manufacturer stated that it never had performed minimum control speed 8/ (V_{mc}) tests on the airplane at a TOGW and CG applicable to the most probable

8/ Minimum Control Speed (V_{mc}) is the speed at which directional control can be maintained with the critical engine inoperative and the remaining engine at takeoff power.

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Table 1.--Weight and balance information.

Seating*	Location	I First manifest weights (lbs) 9/	II Autopsy weights estimated (lbs) 10/	III Second manifest weights (lbs) 11/	IV Most probable loading configuration 12/
Pilot &	Cockpit	170	165	170	165
Passenger		120	150	140	0
Passengers	A	200	250	140	150
Row 1	B	130	150	140	150
Passengers	A	190	225	170	150
Row 2	B	140	140	170	160
Passengers	A	170	160	140	140
Row 3	B	130	85	140	225
Passengers	A	140	150	140	250
Row 4	B	-	-	-	85
Operating weight (BOW)		4,065	4,065	4,065	4,065
Rear baggage		120	163	160	600
Fuel		420	420	360	660
Total takeoff Gross weight (TOGW)		5,995	6,123	5,635 13/ 5,935 14/	6,740
Maximum allowable takeoff weight		6,000	6,000	6,000	6,000
CG	22.7	23.2	24.0 13/	30.6 22.8 14/	

* VAL seat designations are rows 1-5.

9/ Flight manifest data presented to NTSB on August 4, 1984.
10/ Passenger weights based on estimated autopsy weights. (Same seating configuration as Column I.)
11/ Passengers locations and weights according to flight manifest presented to the FAA.
12/ Passenger locations and estimated autopsy weights as determined by NTSB based on the investigation.
13/ As shown on manifest; incorrect TOGW and its associated CG.
14/ Arithmetically correct TOGW and CG.

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weight configuration but that it would expect that for a CG within limits, Vmc would increase from 39 KIAS (6,000 pounds TOGW) to about 40 KIAS (6,740 pounds TOGW). With a CG 5 inches aft of the limit and a 6,740 TOGW, Vmc would be about 40.5 KIAS.

Stall Speeds (KIAS) versus Angle of Bank (throttles closed) for a maximum TOGW of 6,000 pounds would be:

	Angle of Bank			
Flaps (degrees)	0 Degrees (KIAS)	20 Degrees (KIAS)	40 Degrees (KIAS)	60 Degrees (KIAS)
0	49	51	58	76
25	43	44	50	68
56	39	40	47	61

Vmc for this condition would be 39 KIAS. The routine and prescribed climb-out speed for the airplane was 65 KIAS.

1.7 Meteorological Information

There was no certified weather observer at the Vieques Airport. According to the U.S. Coast Guard, the weather about the time of the accident was scattered clouds at 4,000 feet and 5 miles visibility. The winds were from the east at 15 knots. The sea state was about 3 feet from the east, with 1-foot swells. The weather at the Harry S. Truman Airport in St. Thomas, which is 33 nautical miles from Vieques was:

> 1045, record; clouds - 2,000 feet scattered, estimated ceiling 12,000 feet overcast, visibility--7 miles, temperature--88° F., dewpoint--74° F, winds--090° F at 12 knots, altimeter--30.08 inHg.

A qualified weather observer who lives on the Island of Vieques reported that 2 inches of rain had fallen the night before the accident.

1.8 Aids to Navigation

Not applicable

1.9 Communications

Not applicable

1.10 Aerodrome Information

The airport is located 4 miles west of Vieques, Puerto Rico. The Island of Vieques is wholly dependent upon air and water transportation to sustain its economy. The airport has one runway with no instrument approaches. Vieques Airport is not a certificated airport under the provisions of 14 CFR Part 139.

The fueling facility operated by PRPA was located at the east end of the ramp area about 300 feet south of runway 9/27. (See figure 1.) The fueling station consisted of two in-ground steel tanks and one aboveground electric, automotive-type delivery pump.

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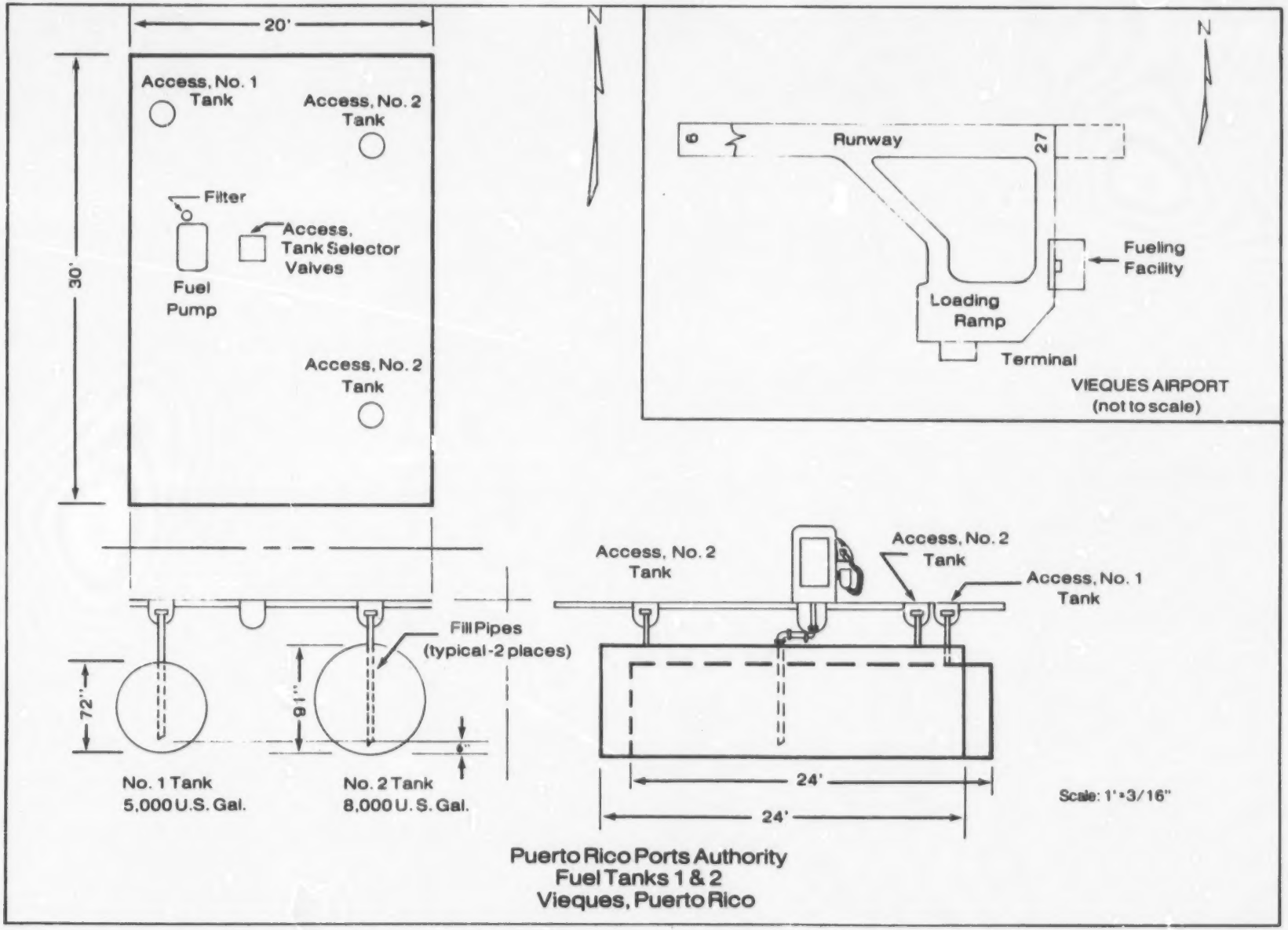

Figure 1.—Fuel facility.

10.

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An in-line fuel filter was attached to the fuel pump outlet (supply) hose. The function of the filter was to remove solids and water from the fuel before the fuel enters the fuel supply hose. The filter manufacturer stated that water can be passed through the filter when the water level in the filter bowl approaches the top of the filter housing at normal operating pressures--about 1 liter. The filter assembly did not incorporate a pressure by-pass function.

The investigation revealed that the filter element had been installed on June 20, 1984, and that its service period would expire in "June 85." When the installed filter element was removed for examination by Safety Board investigators; it was clean and appeared to be new. Four days after the accident, the Safety Board learned that the filter element had been changed on August 3, 1984, the day after the accident. The filter element that reportedly was removed from the filter assembly on August 3 was examined. It was clean and its condition appeared normal. PRPA personnel stated that they drained the filter bowl during the morning water check, which was prior to fueling N589SA, but no one could remember if it contained water. A transparent container was not used to collect the fluid when the filter bowl was drained.

The west tank had a capacity of 5,000 U.S. gallons and was labeled the No. 1 tank. The east tank had a capacity of 8,000 U.S. gallons and was labeled the No. 2 tank. Each tank had a supply pipe which was connected to a gate valve. Fuel was supplied to the pump by selecting one gate valve ON and selecting the other gate valve OFF. Neither of the valves nor the tanks were identified at the installation. The pump was not identified as to the grade or type of fuel being dispensed.

The fill pipes in the tanks were covered by a cap which incorporated a double-cam locking-type device. Underneath each cap was a large rubber gasket which made the cap air-tight when the cam levers were in the down position. The fill pipes were not marked as to type or grade of fuel contained in the tanks. The tops of each fill pipe typically were about 14 inches below the elevation of the concrete pad in a shallow well or pit.

The investigation revealed that 1 day after the accident the gravel base of the No. 2 fill pipe wells was wet and one of the fill pipe caps was loose on its fill pipe adapter, even though the cam locking levers were down (closed position). The cap could be moved vertically and did not provide an air-tight seal. A portion of the cap's gasket was missing; it measured about 1/4 inch wide in circumference. The outside and inside dimensions of the gasket were different from the gaskets on the other fill pipe caps. The loose gasket was red and the other two were black. The loose gasket was harder than the others and it appeared to have been manufactured locally.

Further investigation into the history of the No. 2 tank at Vieques revealed that the tank routinely had water depths averaging 1/4 to 1/2 inch, whereas the No. 1 tank consistently had no water. The diary of water checks indicated that there were some errors in the records when the tank supply source was changed. That is, the tank diary indicated that 1/4 to 1/2 inch of water existed in the No. 2 tank for several days after the tank source was switched from the No. 2 tank to the No. 1 tank. Occasionally, the No. 2 tank indicated a "zero" water level (the usual record level for the No. 1 tank) several days after the supply source was changed. The airport manager stated during depositions that the reason for a zero reading on one day followed by a reading of 1/2 inch the next day was because some PRPA employees thought that since the water level was less than

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1 inch it was not required to be pumped and that a "zero" water level recording was all right. He did not offer a change of tank supply source as a possible explanation for the discrepancies in the diary.

After a very hard rain 2 days after the accident, Safety Board personnel found both fill pipe wells of the No. 2 in-ground tank to be full or partially full of water.

1.11 Flight Recorders

The airplane was not equipped, nor was it required to be equipped, with flight recorders.

1.12 Wreckage and Impact Information

The airplane crashed in a nosedown attitude into the open sea and broke up almost immediately. The fuselage, empennage, and wings, with left engine attached, sank in about 20 feet of water. The right engine separated from its four mounts and from the major portion of the wreckage. The wreckage came to rest on the ocean bottom. Although divers were able to recover all major sections of the airplane, some minor components had been swept away by the ocean currents by the time the major portions of the wreckage were salvaged.

The forward fuselage was crushed rearward to just forward of seat row 3. (See figure 2.) This area included the flight compartment and the first two rows of passenger seats. Both sides of the fuselage were buckled outward about 9 inches beneath the wings in the vicinity of seat rows 3 and 4. The empennage and tail section separated from the fuselage at the rear baggage compartment.

The wing structure almost completely separated from the fuselage; the entire length of the leading edge of the wing was compressed aft and twisted about 30° clockwise (viewed from the top relative to the lateral axis). Both left and right ailerons remained attached to the wing. The left and right trailing edge flaps were in the 56° extended position.

The left side of the vertical fin, the rudder, the horizontal stabilizer, and the elevator essentially were intact and showed no structural damage. There was continuity in trim tab control cables from the tabs to the wing front spar carry-through structure. The elevator and vertical fin were attached to the empennage.

All flight control surfaces were recovered, and the flight control bellcranks, push-pull rods, and cables essentially were intact and operable. The position of flight control mechanisms corresponded to the positions of their respective flight control surfaces. Examination of the control systems and control surface components showed no evidence of prior structural failure or malfunction. Both throttles were fully forward (OPEN), both fuel mixture control levers were in the FULL RICH position, and the RPM controls were forward in the MAXIMUM RPM position. Both left and right engine magneto switches (two each) were found in the Left--"OFF," Right--"ON" positions. The flap actuation/selector switch was found in the DOWN position. Both powerplants were examined on-scene and fluid samples were taken by Safety Board investigators.

The Safety Board disassembled and inspected the engines at the manufacturer's facilities. The internal inspections did not reveal any preimpact mechanical malfunctions or damage which would have caused the engines to cease

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Figure 2.--Britten-Norman BN-2A-6 Islander N589A.

operation. All component fractures were typical of overload consistent with impact forces. The components from both engines were damaged severely by corrosion as a result of immersion in sea water for more than 4 days. There was no evidence of lack of lubrication in either engine. The two top engine mount lugs for the left engine were fractured.

All six pistons and combustion chambers of the left engine exhibited normal deposits of combustion. After the cylinders and pistons were removed, the crankshaft rotated freely as did all accessory drive gears.

Before the cylinders were removed, the crankshaft of the right engine could not be rotated because of salt water corrosion. The top spark plugs indicated some evidence of lead fouling. The tips of the cooling fan blades on the alternator were gouged. The damage to the alternator belt tension arm matched the damage of the cooling fan blades.

Both left and right propeller assemblies were cycled functionally through their full range of operation (12.2° to 80.3°) using shop air. The No. 1 blade of the left propeller assembly was bent aft about 90°. The No. 2 blade was straight and relatively undamaged.

The face of the low pitch stop of the right propeller assembly exhibited a gouge of about 1/10 inch. The dome bore threads were stripped from the low pitch stop of the right propeller assembly. The Nos. 1 and 2 blades were bent aft about 5° and 30°, respectively. The No. 1 blade had a slight twist and the No. 2 blade exhibited a pronounced twist.

1.13 Medical and Pathological Information

Autopsies were performed at the Institute of Forensic Medicine (IFM), University of Puerto Rico. Postmortem examination of the pilot revealed no evidence of pre-impact incapacitation. According to autopsy reports, the pilot and three passengers died as a result of multiple traumatic injuries; five passengers, who also had sustained multiple traumatic injuries, died from drowning.

Toxicological analysis of the occupants, including the pilot, were also conducted by IFM. The results were negative for drugs, carbon monoxide, and ethyl alcohol.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The impact was not survivable for the pilot and the passengers in seat rows 1B, 2A and 2B, because the right front side portion of the fuselage was crushed. The accident was partially survivable for the remaining passengers since the fuselage remained essentially intact, impact forces were within human tolerances, and restraint systems remained intact.

The U. S. Naval Air Station (NAS) at Roosevelt Roads, Puerto Rico (some 10 nautical miles away) was notified of the accident at 0805 and a helicopter, with a swimmer and a physician on board, was dispatched to the scene, arriving about 37 minutes

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later. Upon arrival, the swimmer entered the water to assist local divers. They found no survivors. The Navy notified the Coast Guard at San Juan (Isla Grande Airport) at 0814, and the Coast Guard sent a helicopter from Borinquen (about 95 nautical miles away) which arrived on the scene at 0954. A U.S. Navy C-12 airplane was sent to the scene and coordinated Navy and Coast Guard activities there. Responding on the beach area were the Vieques police department; the fire department; the director of civil defense, who was notified at 0815 and placed the hospital disaster plan into effect; an ambulance and a physician from a nearby hospital; and a Naval Ammunition Supply Depot (NASD) ambulance, with a hospital corpsman.

The local fishermen who recovered the bodies stated that the airplane came to rest in a right wing-down attitude. Divers found all of the airplane occupants in their seats with seatbelts fastened. Comparing the locations of the passengers in the wreckage with the seating assignments listed on the passenger manifest, it was determined that every passenger in the airplane was sitting in a seat different from that which was assigned on the manifest.

Ten Eastern Aero Marine Model GA-12 personal flotation devices were required by VAL's operations specifications to have been on board the airplane; however, divers saw no flotation devices on the day of the accident or during the 4 days following during which the wreckage was recovered. Ten flotation devices, reported by VAL to have been recovered from the wreckage, were examined by Safety Board investigators. Four devices had loose CO_2 cylinders and gas could be heard escaping from two of the four devices. One of the four devices (which did not leak) had been inspected by a VAL mechanic 4 months before the accident. A fifth device, which had a tight CO_2 cylinder, also leaked after it was inflated. Investigators examined seven flotation devices from another VAL airplane, which were not in sealed pouches and thus were readily accessible. Three of the seven devices had loose CO_2 cylinders. At the request of the Safety Board, the FAA later inspected all flotation devices owned by VAL and found that about 40 percent had loose CO_2 cylinders.

The airline had purchased 30 new Model GA-12 flotation devices in July 1984, and they were delivered in sealed plastic pouches. There were no requirements or procedures to check the security of the CO_2 cylinders. The sealed pouches would have prevented access to the devices. Three of the seven flotation devices which were reported by VAL to have been on board the airplane were in sealed pouches. They had loose CO_2 cylinders and leaked after they were inflated.

The passenger briefing card found in the airplane wreckage actually was applicable to the BN-2A Mk III Trislander in that it depicted two fire extinguishers in the airplane when only one was required and carried on the BN-2A-6. The passenger briefing card showed a passenger donning a life vest with the oral inflation device and the manual inflation tab on the left side of the life vest. Actually, these items are located on the right side of the life vests used by VAL.

The rightside of seatback 4-B had separated from its seatpan frame. The seatbelt insert (male portion) and the seatback fastening bolt were missing. The inboard ear of the seat bottom flange, which fastens the seatback to the seatback had separated in overload to the left and was missing. The boltholes in the seatpan frame and in the remaining seatpan frame were not damaged.

According to the VAL maintenance log, new seatbelts had been installed at seat rows 1, 2, and 3 on July 25, 1984.

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1.16 Tests and Research

1.16.1 PRPA Fuel Tank Integrity

On August 4, 1984, the investigation team requested that the PRPA determine the leakage, condition, and continuity of the fuel tanks at Vieques Airport. Tests of the tanks were conducted for the PRPA by an independent contractor on August 22, 1984. All tank openings were sealed and pressurized air was applied to each tank for 24 hours. Both the Nos. 1 and 2 tanks held air under pressure indicating that there were no internal leaks.

1.16.2 Tests of Fuel Samples

Fluid samples were taken for analysis from the accident airplane wreckage, the fueling facility, and the sea. The samples were tested at the Petroleum Testing Laboratory, Supply Department, U.S. Naval Station, Roosevelt Roads, Puerto Rico. The fuel sample from the accident airplane contained fresh water. It was obtained from the left engine fuel feed line between the engine mounted fuel pump and the carburetor inlet fitting. The sample size was about 1/4 ounce in volume (about 30 drops of liquid). Analytical testing procedures indicated that the sample contained about three drops of fuel; the remainder was fresh water. No fresh water was found in any other location in the wreckage of the accident airplane.

The two samples from the Mk III Trislander, N624BN, were taken by the FAA Principal Maintenance Inspector about 1100 on the morning of the accident and each was about 1-quart in volume. Analytical testing indicated that the fluid mixture consisted of both fuel and fresh water. Based on what was known at the time the fuel sample testing was requested, the physical properties of the fresh water contaminated fuel were not requested; the testing facility did not have the capability to determine such physical properties or differentiation between rain water or common tap water. One 1-quart sample contained about 10 percent fresh water. The other 1-quart sample contained about 25 to 30 percent fresh water.

1.17 Additional Information

1.17.1 Weight and Balance Procedures

Vieques Air Link's FAA-approved Operational Specifications, Part E, page 1, states that "actual passenger weight will be provided for in the Operator's Company Manual." The company manual requires that actual passenger weights must be used in all computations but this weight may be obtained by "asking the passenger directly."

The VAL counter agent who prepared the weight and balance flight documents for Flight 901A at Vieques Airport reported for duty at 0600 on August 2, 1984. As a counter agent, he was responsible for calculating the weight and balance as incorporated with the flight manifest for VAL. In order to calculate a precise weight and balance, he would have had to weigh each passenger. He stated during testimony that rather than weigh each passenger he asked them their weight and used these figures for the weight and balance computations which was VAL's FAA-approved procedure for determining weights. He did not recall a passenger who weighed more than 200 pounds. He said there was 163 pounds of baggage on the flight, which consisted entirely of suitcases. Though fruit was found in the wreckage, he testified that he did not remember seeing or weighing any boxes of fruit. The only box he remembered was a box of oil samples. He could not explain why he had entered 120 pounds of baggage on the flight manifest instead of 163 pounds.

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Divers who worked to recover the wreckage about 6 hours after the accident stated that there were hundreds of mangoes (fruit) on the ocean floor despite an east to west current. Testimony of a pilot who came forward following the accident stated that (1) there were 3 large egg cartons of mangoes and a partially filled potato sack of mangoes on the airplane; (2) that there were at least five or six suitcases aboard the airplane in the baggage compartment that pushed the rearmost seatback forward; and, (3) that the horizontal stabilizer was at his head height while the airplane was parked on the ramp (lower than normal). He estimated the baggage weight alone at 300 pounds.

The counter agent said that he had been trained by VAL in procedures for calculating weight and balance. During the completion of Flight 901A's manifest, he referred to the company manual for the moments for each passenger and each piece of baggage according to the location on the airplane. He stated that the pilot came to the ticket counter and checked all the figures on the flight manifest. He said the pilot used the airplane flight manual and a calculator to check the weight and balance calculations before he accepted and signed the manifest. No one other than the counter agent witnessed the pilot's verification of the manifest. Another VAL captain testified that he did not specifically check weights and c.g. computations and that he did not know any other VAL pilots who had the time to check the computations. He stated, however, that he was cognizant of what was being loaded into his airplane. He said he did not know the specific preflight and weight and balance preparation habits of the pilot of Flight 901A.

1.17.2 Fuel System Description

The airplane fuel system consisted of two integral tanks, one in each wing; each tank had a capacity of 68.5 U.S. gallons. A semicircular fuel sump about 18 inches long and with a 3-inch radius was attached to the underside of each wing tank. The bottom of each integral tank surface contained four 0.300-inch-diameter holes through which fuel drained into the sumps. The holes were evenly spaced longitudinally along the centerline of each tank and in front of the wing surface stiffeners. A fuel drain plug and a water drain valve were located at the bottom of each sump. The fuel supply line and suction screen were located within the sump about 1 inch from the bottom and immediately adjacent to the sump's rear sealing plate. Each sump's capacity was calculated to be about 1.36 U.S. gallons.

About 0.75 U.S. gallon of fuel within each sump is unusable fuel because of the location of the fuel supply line within the sump. Normal fuel feed in the BN-2A is from each wing tank (left or right) to its corresponding engine. Fuel is drawn from the sumps and is delivered by electrically driven fuel booster pumps through a three-way fuel valve, a gascolator filter, and an engine-driven fuel pump to the carburetor. The gascolator has a drain valve on the bottom of its bowl. Interconnecting pipelines between the right and left fuel valves enable either engine to be fed from the opposite tank if necessary. The fuel position of the valves in the wreckage was found to be normal tank to engine (no crossfeed operation). Pilots are not required to drain the gascolator bowl during preflight. They must, however, drain the wing sumps. The gascolator will collect solids and water which have entered the fuel feed lines. If the gascolator bowl fills up with water, all fluid including water will pass into the engine.

Due to the unique design of the four 0.300-inch diameter fuel feed holes in the center-bottom of the integral wing tank structure that feeds the fuel sump, contaminated fuel (water) could be trapped in the outer portions of each tank if the airplane is not level. If that occurs, water would not drain into the fuel tank sump and would not be detected when the sumps are drained on preflight inspection.

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In 1968, Britten-Norman developed a modification of the basic BN-2A fuel supply line and filter installation (modification NB/M350) to ensure compliance with Australian certification requirements pertaining to water in the fuel. The modification relocates the engine fuel supply line by moving it forward 8.5 inches from the sump's rear sealing plate and raising it from 1.05 to 2.25 inches above the bottom of the sump. This provides increased protection against a loss of engine power due to fuel contamination since any undetected water or other contaminants tending to move toward the aft end of the sump during takeoff would move away from the fuel supply line rather than toward it. Moreover, the modification provides for a substantial additional capacity within the sump to contain water or other contaminants below the level of the fuel supply line.

There were, as of December 31, 1983, approximately 120 Britten-Norman airplanes registered in the United States, including the 10-place BN02, BN-2A, BN-2B, and BN-2T Islander and the 18-place BN-2A Mk III Trislander, and it is estimated that there are more than 1,000 of these airplanes in operation throughout the world. They are used principally as feederline transports in air taxi/commuter operations. Except for those airplanes exported to Australia, Britten-Norman currently incorporates the fuel supply line and filter installation modification on other Islander and Trislander airplanes only as an optional item.

1.17.3 Refueling Procedures and Precautions

PRPA is responsible for the storing and dispensing of aviation fuel at all Puerto Rico regional airports, including Vieques Airport, the maintenance of the fuel tank installations, and the quality of the fuel dispensed. The regulations for dispensing fuel and flammable materials are listed in Part IV of the Commonwealth of Puerto Rico, Puerto Rico Ports Authority, Resolution No. 8213(R), Airport Regulations. (See appendix F.) Additionally, there were two PRPA, Department of Aviation, memoranda in effect which amplify the regulations. The memoranda are liberally translated as follows:

A. DEPARTAMENTO DE AVIACION CIRCULAR ADMINISTRATIVA (DACA)
Number 65 (Aviation Department Administration Memo)
Date: May 18, 1981

This directive requires PRPA supervisors to assure that each fuel tank is checked for the presence of water each working day and that the check for water is done at 0800 and before the first fuel delivery of each day. A water finding paste must be used to verify the level of water in each tank. The water must be removed each time the measurement is greater than one inch.

B. DEPARTAMENTO DE AVIACION CIRCULAR ADMINISTRATIVA (DACA)
Number 66 (Aviation Department Administration Memo)
Date: Nov. 23, 1981

This directive requires that 1) the water separator/filter be drained before the first delivery each day, 2) the fuel filter be changed on a 12-month schedule or less, and 3) the date the fuel filter element was installed be marked accordingly.

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The presence of water in a tank is determined by applying about 2 inches of water-indicating paste to the tip of a dip stick, which is then placed in the tank. The dipstick is required to be held in the filter access pipe of the tank for at least 1 minute. If water is present, the color of the paste changes from yellow to bright red. The water depth is then recorded.

To remove water from a storage tank, the suction pipe of a hand pump is inserted through a fill pipe access to the bottom of the tank and the tank is pumped, thereby drawing the fluid from the bottom of the tank.

1.17.4 Vieques Air Link, Inc., Operations

Vieques Air Link, Inc., holds Air Carrier Operating Certificate No. AT-761-57, effective date September 14, 1979. According to the FAA-approved operations specifications, VAL is authorized to conduct air taxi operations as an air carrier engaged in air transportation, or commercial operations as a commercial operator, in accordance with the applicable provisions of Federal Aviation Regulations (FAR) 14 CFR 135, other FAR's, and the terms, conditions, and limitations contained in the specifications.

VAL Inc., was authorized to perform "on-demand" and scheduled commuter air carrier operations under its operating certificate. In the category of on-demand charter operations, the airline was permitted to use multi-engine land airplanes which accommodated 10 to 19 passengers in day and night visual flight rules (VFR) operations. In airplanes which accommodated 9 or fewer passengers, it was permitted VFR day and night operations in single and multi-engine land airplanes. VAL was first certificated in 1965; the company received its first 14 CFR Part 135 operating certificate on September 14, 1979.

VAL Inc., operated six Britten-Norman Islander BN-2A airplanes; one Britten-Norman BN-2A Mk III Trislander, a 3-engine airplane, and two Piper PA-32-260 Cherokee 6 airplanes. All of these airplanes, except for the Mk III Trislander, can be flown with one pilot. The Mk III Trislander requires a second-in-command pilot. According to 14 CFR Part 135.243(a), pilots-in-command of multi-engine airplanes in commuter air carrier operations are required to hold FAA Airline Transport Pilot (ATP) certificates. On-demand charter flights require the pilot-in-command to hold only an FAA commercial pilot certificate (14 CFR 135.243(b)(1), (2), (3).

On March 5, 1982, VAL was granted an exemption (exemption 3479) from 14 CFR 135.243(a) which specifies that a pilot must hold an ATP certificate to serve as pilot-in-command in passenger carrying operations in a turbojet airplane, with 10 or more passenger seats, or a multi-engine airplane used as a commuter air carrier. VAL's petition for exemption was for day VFR flights from Vieques, to San Juan, to Humacao, to Fajardo, and to St. Croix, U.S. Virgin Islands, nearly identical to those conducted by Virgin Air and Dorado Wings Airlines, both of which had received exemptions for such operations. The reasons for the exemption included an "unwarranted economic hardship" to VAL and the disruption of essential services to the traveling public of Vieques and to the tourist industry of the island.

The FAA granted the exemption and determined that the operations could be conducted safely without pilots possessing an ATP certificate because IFR conditions were so rare in the area, and because the petitioner operated airplanes with nonretractable (fixed) landing gear. Also, the airplanes operated at slow speeds and flew into terminals which did not have a high volume of traffic. Additionally, the FAA

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determined that the "utilization of the autopilot, and the fact that many new technological advances have been made in today's more sophisticated airplanes, further demonstrates that this exemption is in the public interest since there will be no degradation of safety."

The first condition and limitation listed for operation under the exemption was:

> Pilots-in-command used under the terms of this exemption must hold commercial pilot certificates with instrument ratings and must meet the experience requirements of 14 CFR Part 61.155.

In effect, the first condition limited pilots under the exemption to those eligible for an ATP certificate (i.e., who had the requisite flying hours) who had not passed the written exam and taken the prescribed flight check. The exemption was to be terminated automatically on December 31, 1983.

On August 17, 1983, VAL petitioned the FAA for an extension of exemption 3479. Additionally, the airline requested that the first condition of the exemption be changed to require that VAL's pilots-in-command only meet the experience requirements of 14 CFR Part 61.155(b)(1) and 14 CFR 135.243(b) and that the exemption be extended to allow both day and night VFR operations. This request would, in effect, allow pilots with a commercial pilot's certificate to serve as pilot-in-command with only 500 hours total flying time in commuter operations rather than the 1,500 hours required for an ATP certificate.

VAL maintained that the 1,500-hour requirement of 14 CFR Part 61.155(b) would deny employment to young pilots who otherwise were qualified for employment. VAL stated that well trained pilots could operate its airplanes safely under the requested conditions and limitations.

The FAA denied the petition for the amendment and extension of exemption 3479 on November 29, 1983. The FAA determined that approval would not be compatible with the level of public safety required in scheduled passenger-carrying operations conducted with multi-engine airplanes. The effect of the FAA denial was that VAL pilot employees had to hold ATP certificates to serve as a pilot-in-command in scheduled passenger-carrying operations conducted in a multi-engine airplanes. The FAA also found that VAL failed to show how it would provide an equivalent level of safety by utilizing a pilot who does not possess the aeronautical experience required for an ATP certificate.

According to VAL operations specifications, the director of operations is responsible for all aspects of company operations. They specify that he may delegate functions to other personnel, but that he retains responsibility. The operations specifications also state that the president, director of operations, and chief pilot have the authority to exercise operational control of the company with respect to initiating, conducting, or terminating (VAL) flights. 14 CFR Part 135 only addresses training requirements for flightcrew members. Accordingly, the approved FAA training manual for VAL does not address training requirements for counter agents. The VAL counter agent was carrying out company policies as directed by the director of operations. The VAL counter agent on duty at Vieques on the morning of the accident testified that he determined that Flight 901A was an extra section and that he considered it to be an on-demand operation. He did not hold a pilot's license; he said that he had been trained as a VAL counter agent.

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VAL's schedule advertised six departures to San Juan and six arrivals from San Juan daily. Two roundtrips were scheduled daily between Vieques and St. Croix, U.S. Virgin Islands. Two roundtrips were scheduled daily, except Saturday and Sunday, between Vieques and Humacao. Two roundtrips were advertised between Fajardo and St. Thomas, U.S. Virgin Islands. Four additional scheduled flights, 502, 503, 506, and 507, did not appear on the VAL schedule. No records existed to show which scheduled flight operated daily and the records did not indicate which commuter flights were flown.

The Safety Board requested and received all available flight manifests for the 2-week period preceding the accident, from July 17 through August 2, 1984. A total of 654 manifests were made available. A total of 577 scheduled flights were included on VAL's published flight schedule for this same 2-week period. However, only 423 flights from the 654 manifests could be matched with the 577 published flights. The other 154 scheduled flights could not be accounted for as "scheduled flights" using the remaining 231 flight manifests. Those 231 manifests showed various flight designations, such as "on-demand," "charter," and in some cases, "extra sections" where no scheduled commuter flight had been flown. Some manifests were illegible and their operational status could not be determined. No operation was identified in which a non-ATP-rated pilot had flown a flight which was listed as a commuter flight.

1.17.5 Vieques Air Link Inc., BN2-A Operational Procedures

The VAL operations manual states in section VI, Refueling Procedures, Home Station, that the pilot-in-command shall insure that the aircraft is fueled with the proper grade of uncontaminated fuel and shall take samples from the fuel drain sumps in adequate supply to assure no contamination after each refueling. In the event of fuel contamination or improper fuel grade, the tanks shall be drained by appropriate services personnel and refueled to the pilot-in-command's satisfaction.

The BN-2A engine failure procedure is as follows:

Engine Failure

Failure of One Engine After Take-Off
Immediate Action (in the event of an engine failing after take-off speed is reached, and while the airplane is climbing).

1. Ensure full take-off power is applied to both engines and that the mixture controls are selected fully RICH.
2. Determine the inoperative engine.
3. Select mixture control lever - IDLE CUT OFF.
4. Select propeller control lever - FEATHER.
5. Ensure that the generator on the operative engine is selected ON.
6. Allow the airspeed to build up to 65 KIAS (75 MPH).
7. Select flaps UP and trim out the resultant stick force.
8. Adjust the rudder trim as necessary for the climb.
9. Select throttle control lever - CLOSED.
10. Select appropriate fuel tank - OFF.
11. Select appropriate magnetos - OFF.
12. Select appropriate auxiliary fuel pump switch - OFF.
13. Select appropriate generator field switch - OFF.

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Warning

It is essential to raise the flaps to the fully up position (retracted) to achieve the optimum climb gradient.

The best single-engine rate of climb speed for the BN-2A is 65 KIAS with the flaps retracted.

Water ditching procedures are discussed in the VAL Company Procedures Manual. Those procedures are as follows:

Section: VIII, page 18-a, Revision No. 15, Date: 17 Feb. 1984

Ditching

Pilot-in-Command assigned duties:

1. Continues flight.
2. Determines appropriate ditching procedures according to conditions.

Second-in-Command assigned duties:

1. Handle all communications.
2. Assist the passengers in locating emergency exits and flotation gear.
3. Brief passengers on proper use of flotation gear.
4. Assist passengers in evacuating aircraft.

Note: After evacuation has been accomplished, PIC and SIC will instruct the passengers on proper method of awaiting rescue mission.

1.17.6 FAA Surveillance and Actions

FAA principal inspectors who are responsible for the surveillance of air taxi and commercial operators with a maximum passenger configuration of 30 seats or less and a maximum payload capacity of 7,500 pounds who conduct flight operations under the authority of 14 CFR Part 135 are governed by FAA Order 8430.1C, Inspection and Surveillance Procedures - Air Taxi Operator/Commuter Air Carriers and Commercial Operators.

The FAA Flight Standards District Office (FSDO) in San Juan, Puerto Rico, is responsible for the surveillance of VAL. At the time of the accident, the San Juan FSDO had six principal operations inspectors and five airworthiness inspectors. Of the six operations inspectors, three were designated certification inspectors and three were surveillance inspectors. Those inspectors were assigned to monitor 12 commuter carriers and air taxi commercial operators in the geographic area near San Juan. Not all of the operators are located on the San Juan airport; two are located at St. Thomas and two at St. Croix.

VAL carried about 11 percent of the commuter traffic in the area, based on 1983 data. The San Juan FSDO expended about 14 percent of its available surveillance man-hours on VAL in the year before the accident. For the 10-month period (October 1, 1983, to August 2, 1984) before the accident, the FAA conducted numerous inspections of VAL operations as shown below in table II.

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Table II.—FAA Surveillance of VAL
(October 1, 1983 to August 2, 1984)

Inspection type	Routine	NATI 15/	Total
Operations			
Operator inspection	-	-	-
Check airman	1	-	1
Main base	1	-	1
Sub base	-		
Line station	1	5	6
Ramp check	6	13	19
Training		1	1
Personnel records	1	1	2
Enroute		6	6
Manual/Procedures	1	1	2
Dispatch center	0	0	0
Airport	4	0	4
	15	27	42
Maintenance			
Mechanic	0	3	3
Repairman	-	-	-
Main base	1	1	2
Sub base	-	-	-
Line station	0	1	1
Fueling facility	2	0	2
Spot check	1	2	3
Ramp check	3	2	5
Training	2	1	3
Personnel records	1	1	2
Aircraft maint. records		3	3
Enroute	1	2	3
Manual/procedures	2	1	3
Airport	-	-	-
	13	17	30
Total	28	44	72

The surveillance records indicated that prior to the NATI program there had been only one operations check of VAL since exemption 3479 expired on December 31, 1983. That inspection was a ramp check which was conducted at Isla Grande Airport on February 2, 1984. During the National Air Transportation Inspection (NATI) program in March 1984, and during the time when VAL was preparing to introduce into service the Mk III Trislander, the records indicated that out of 44 NATI inspections, 27 inspections were operations inspections and 17 were maintenance inspections. Of the 42 total operations-type inspections, 19 were ramp checks which are generally unannounced. Of

15/ The National Air Transportation Inspection program conducted in March 1984 and directed by the Secretary of Transportation.

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the maintenance inspections, 8 were spot and ramp checks inspections which also are generally unannounced. Of the 72 total inspections for the period, 44 inspections were conducted during the NATI program. During the NATI program, FAA airworthiness inspectors wrote up seven aircraft condition notices on VAL airplanes. Those notices were concerned mostly with minor airframe and engine items. No condition notices were written on the accident airplane. Of these 72 inspections, 1 operations and 2 maintenance inspections results were unsatisfactory. These unsatisfactory inspections were due to inadequate distribution of life vests by the pilots and the availability of the flight manuals in airplanes, respectively.

On March 31, 1983, the FAA initiated an enforcement action against VAL in the form of a letter of investigation on an airworthiness subject. This subject has not yet been adjudicated and outcome is still being processed. On August 6, 1984, following the accident, the FAA issued a letter of investigation with formal recommendation for a civil penalty on the conduct of operations. On August 8, 1984, the FAA issued an amendment to the operations specifications in the form of a change to the VAL operations manual, requiring that the actual scale weight of passengers be used for weight and balance computations instead of allowing the procedure of asking a passenger directly for his weight.

During the first 5 days of the investigation, Safety Board investigators inquired about and were advised by FAA personnel assigned to the on scene investigation that the practice of designating a flight "on-demand" after the scheduled departure time had passed was permissible under the regulations. After designating a flight on-demand in that manner, the rules would require only that the pilot possess a Commercial Pilot Certificate and not an ATP Certificate. On August 6, 1984, the San Juan FSDO sent a telegraphic message to the Air Transportation Division in FAA Headquarters requesting clarification and interpretation of 14 CFR Part 135.243. The next day, the FAA determined the accident flight was a "commuter flight" which would have required an ATP-certificated pilot.

Following the Safety Board's investigation, and in reference to its question as to exactly what constitutes a commuter flight operation, the FAA, on September 7, 1984, issued a policy memorandum to all regional flight standards district managers concerning 14 CFR Part 135 commuter requirements in which the following comments were made:

> "Scheduled operations" means any operations that are conducted in accordance with a published schedule for passenger operations which includes dates or times (or both) that is openly advertised or otherwise made available to the general public.
>
> and,
>
> delayed flights, equipment substitution, and multiple section flights made by a commuter operator to protect a schedule are considered "commuter operations" and must meet all Part 135 commuter requirements.

On November 16, 1984, the FAA headquarters staff provided additional guidance in an internal memorandum. It stated the following:

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The "commuter" receives passengers in the morning for a destination that is not scheduled until 6:00 p.m. This would normally be considered an "on-demand" operation. However, if the commuter is soliciting passengers for an "unscheduled" commuter flight and calling it an "on-demand" operation, this could be considered circumventing the rules. Advertising by word of mouth, etc., about departure times to various locations, especially to vacation spots served only by air taxi or boat, would be suspect for this kind of activity.

In this case of flight cancellation due to equipment, etc., or excess demand, an "on-demand" operator other than the certificate holder could be substituted for the commuter run; however, the passengers should be advised of the change. In this case, the operator would not have to meet the ATP requirement.

On June 28, 1985, the Administrator of the FAA issued Emergency Revocation Order 8550610037, dated June 25, 1985, to VAL suspending its operations. (See appendix G.) The order stated that VAL officers and employees knowingly prepared a false flight manifest for the accident flight and presented the fraudulent manifest to Safety Board investigators. Also cited in the order was (1) VAL's violation of 14 CFR Part 135.243(a) regulations in their use of an improperly certificated pilot, (2) the operation of the accident aircraft without compliance with flight manual weight and balance limitations; and, (3) VAL's careless and reckless operational behavior which endangered the lives and property of others.

1.18 New Investigative Techniques

None.

2. ANALYSIS

2.1 General

Weather was not a factor in the accident. There was no evidence of pre-existing psychological or physiological factors that might have affected the pilot's performance adversely. There was no evidence to indicate preimpact failure or malfunction of the airplane's flight controls, systems, or structure that would have caused or contributed to the accident. The airplane records indicated that the airplane was maintained in accordance with existing regulations.

2.2 The Accident

The physical evidence revealed conclusively that the left engine was not producing power on impact. Based upon the finding of fresh water in the left engine fuel system, the Safety Board concludes that the loss of power was caused by fuel contamination. All other possible causes for the left engine failure were ruled out based upon postaccident examination of the engines. Therefore, the Safety Board's analysis of the evidence in this accident focused on the reasons why the airplane apparently stalled and crashed uncontrolled into the ocean.

The stripped right-hand propeller dome threads, the aft bending of the two right-hand propeller blades, and the rotational damage of the right engine alternator, all indicated that the right engine was producing some power at the time of impact. In view of the fact that water contamination was found in the airplane's fuel system, it is possible that the right engine may have lost power intermittently or surged at some point during

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the accident sequence due to water in the fuel. Witness observations tend to support this possibility in that they heard intermittent engine sounds during the airplane's climb out. The Safety Board, however, was not able to determine if the right engine did in fact lose power at some point during the maneuver and can only conclude that some power was being produced at impact.

Witnesses saw the airplane roll to the left and make an abrupt pitch-down maneuver. Their description, in addition to the physical damage to the airplane, is consistent with a loss of power on the left engine followed by a loss of control of the airplane.

Since the left propeller was not feathered and the flaps were found full down, it is evident that the pilot did not follow prescribed emergency procedures for single-engine operations. The emergency procedures require, in part, feathering the inoperative engine propeller, allowing the airspeed to increase up to the best single-engine rate of climb speed of 65 KIAS, and retracting the takeoff flaps (25 degrees). Failure to accomplish all these procedures will degrade significantly the airplane's climb performance and controllability. Directional control would be lost if the speed is allowed to decrease below the minimum control speed (V_{mc}) of 39 KIAS. The fact that the flaps were found full down indicates that the pilot either did not know the correct flap configuration to use in this emergency or that he inadvertently moved the flap control switch to the wrong position. In any event, the airplane's abrupt roll to the left followed by its nose pitching down steeply indicated that the pilot lost control of the airplane when the airspeed decreased below V_{mc}. The extended flaps and unfeathered left propeller undoubtedly aggravated the condition to the extent that the pilot was not able to regain control of the airplane before it struck the water.

An overgross weight condition of the airplane coupled with an aft CG at takeoff for the most probable loading configuration (6,740 pounds and CG 30.6) would have complicated the pilot's problems in handling an engine-out emergency. The 6,740-pound gross weight may not have been the actual condition at takeoff for the airplane. The Board believes that, based on all of the evidence, that the airplane was as much as 600 to 700 pounds over its certificated TOGW, and its CG was as much as 5 inches aft of its 25.6 inch rearmost limit. These adverse weight and balance condition would decrease the response time available for the pilot to maintain control and would reduce the performance capabilities of the airplane. Although the performance calculations did not indicate a significant degradation of stall speed and V_{mc}, the Safety Board believes that the overweight and out balance condition contributed to the cause of the accident.

Notwithstanding the possibility that both engines may have been inoperative at some point during the accident sequence, the airplane could have been controlled because of a reasonable margin between Vmc and the specified and routine climb out speed of 65 KIAS. Therefore, a controlled ditching into the sea could have been accomplished because the airplane should have been flying at 65 KIAS at the time the engine failed and the pilot should have had sufficient time to lower the nose and avoid a stall and loss of control. While the results of an open sea ditching cannot be predicted, there is no doubt that the chances of survival for some or all of the passengers would have been greatly enhanced. Since the flaps were full down and the inoperative engine propeller was not feathered, the Safety Board believes that the pilot did not execute any emergency procedures. The pilot's failure to maintain airspeed and failure to execute emergency procedures properly was a major cause of the accident.

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The pilot's improper performance of the emergency procedures indicates a lack of proficiency due to inadequate training and insufficient experience in the BN-2A Islander. The pilot claimed he had 1,085 hours total flying hours and 480 hours in the BN-2A Islander on a form he completed for VAL's insurer. However, investigation disclosed that he had at most only 723 total hours, 182 hours of which were multi-engine experience. Of the 182 multi-engine hours, 37 were dual instruction hours. He had only 71 total hours in the BN-2A, 53 hours of which were as pilot-in-command. Therefore, the Safety Board concludes that the pilot was an inexperienced multi-engine pilot and that his inexperience contributed to the accident. Further, because he did not have an ATP certificate, the pilot legally could fly only on-demand/charter flights. Although it was difficult to establish the flight and duty times of the pilot because of incomplete information in the operations department, the Safety Board was able to determine that the pilot had been given the prescribed off-duty time required for a pilot of either an on-demand/charter or commuter air carrier.

With regard to fuel contamination, a small amount of fresh water was found in the fuel feed line to the left engine of the accident airplane. The investigation revealed that (1) the accident airplane did not receive fuel from any other source; (2) water was found in the No. 2 in ground tank on the morning of the accident; (3) 2 inches of rainfall was recorded on the island the night before; (4) one of the No. 2 tank filler caps was of improper material and size, preventing the cap from sealing tightly; and (5) that the fill pipe wells were prone to flooding during a heavy rain.

On the morning of the accident, after finding the water level in the No.2 tank to be above the 1-inch limit, the ramp inspector should have purged the tank of water prior to fueling the Mk III Trislander, in accordance with PRPA procedures. If PRPA personnel had effectively purged the No. 2 storage tank, contaminated fuel would not have been pumped into the accident airplane. No explanation was offered by the PRPA as to why the No. 2 tank was pumped again about an hour after the accident except to make sure that there was no water in the tank to prevent dispensing additional contaminated fuel. Since the quantity of liquid purged was estimated to have been about 250 gallons, the Safety Board believes that the No. 2 tank contained more than the 1 1/2 inches of water initially measured and reported because the quantity is consistent with the calculated 288-gallon volume of the tank below the end of the suction pipe, which was about 6 inches above the bottom of the tank. In addition, sizeable quantities of water remained on the ramp after the second pumping at 0930. Therefore, the Safety Board concludes that the reported "first pumping" early in the morning was not accomplished or it was ineffective in removing the water from the tank and that the water level in the tank was high enough for water to have been drawn into the suction pipe when the accident airplane was refueled. The Board further concludes that this was the source of the water found in both the Mk III Trislander and the accident airplane.

A plausible explanation of how the Mk III Trislander could have flown to Fajado and back without a power interruption due to water contamination is that the Trislander is equipped with an 8-inch-long suction probe which in effect increases the size of the fuel sump. The increased sump size would allow the sump to trap larger quantities of water before reaching the level of the suction pipe.

The Safety Board believes that water in the left sump of N589SA entered the engine fuel supply line port at the aft end of the sump during the takeoff roll or shortly after rotation for takeoff. Because the water drain valve is located at the aft end of the sump, a quantity of water present in the sump while the airplane is parked on a downslope

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or in a nosedown attitude would not be drainable and would present a hazard during takeoff since the combined effects of acceleration and rotation would move the water directly aft to the fuel supply line port. In general, the presence of water in the fuel in Britten-Norman BN-2 series airplanes presents a unique design and operationally induced risk of engine failure or malfunction since the fuel outlet line is located within the sump, the natural repository for contaminants.

On the day of the accident, the airplane was landed at 0736, and after deplaning passengers, was taxied to the fuel pump about 0745. The airplane taxied for takeoff about 0755, so that fueling, preflight, and loading would have had to have been completed within about 10 minutes. Although no witnesses observed the pilot make a preflight inspection of the airplane, including draining the fuel tank sumps, this quick turn-around may not have permitted enough time for water to settle out after the refueling. 16/ Also, any water that may have had a chance to settle out of the fuel could have been trapped in the outer portion of the wing tank, if the airplane was not level while parked on the ramp. Further, water that had drained out of the fuel tank into the sump could have been trapped in the forward end of the sump if the airplane was in a nosedown attitude while parked. Under these circumstances, the Safety Board concludes that any effort on the part of the pilot to assure after the refueling that the fuel was not contaminated by water, likely would have been ineffective. As a result of the circumstances, the Safety Board believes that checks for fuel contamination should be required prior to each flight and after proper water settling time with the airplane in a level attitude. These procedures should be included in the FAA's operations specifications applicable to all air taxi/commuter operators using the Britten-Norman series airplanes. Since these checks cannot be made effectively unless the airplane is in a level attitude, a device to measure airplane attitude should be incorporated as an integral part of the airplane design.

With respect to the accident, the Safety Board concludes the fueling facilities and fueling operations at the Vieques Airport were not adequate to assure the distribution of uncontaminated aviation fuel. The poor sealing of the fill pipe in the No. 2 storage tank should have been obvious by cursory inspection. Also, the daily water checks should have provided notice to PRPA personnel that a water problem existed in the No. 2 tank. Further, although the PRPA had issued specific directives regarding water checks and purging before dispensing fuel from the tanks, the fueling personnel did not comply with the directive before pumping fuel into the accident airplane and another VAL airplane. Finally, the postaccident purging of the No. 2 tank established that the tank contained far more water than the 1 1/2 inches measured by the PRPA ramp inspector which indicates that the measurement was not properly accomplished.

2.3 VAL Operations

Vieques Air Link was authorized by its operations specifications to operate both commuter air carrier and on-demand air taxi flights. A commuter air carrier under 14 CFR Part 298 means an "Air Taxi Operator" that carriers passengers on at least five roundtrips per week on at least one route between two or more points according to published flight schedules that specify the times, days of the week, and places between which those flights are performed. VAL had an extensive published schedule of flights,

16/ According to FAA Advisory Circular 00-34A, Aircraft Ground Handling and Servicing, the minimum time after refueling for water to settle out of aviation gasoline is 15 minutes per foot-depth of fuel. With about 4 inches of fuel in each wing tank, a minimum of 5 minutes should have been allowed for water to settle out of the fuel.

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one of which was Flight 901. Except for the difference in departure times, Flight 901A was identical to Flight 901. In addition, since the passengers on board Flight 901A had reserved seats on and had purchased tickets for Flight 901, the Safety Board concludes that the accident flight was in fact a scheduled commuter air carrier flight, even though VAL designated the flight as an "extra section"/on-demand operation. Since Flight 901A was in fact a scheduled commuter air carrier flight, it required an ATP-certificated pilot, and since the assigned pilot held only a commercial pilot certificate, VAL was not in conformity with its operations specifications and governing regulatory safety requirements.

The manner in which the accident flight was dispatched by VAL gives the Safety Board serious concern. The decision to designate Flight 901A an extra section while at the same time considering it an "on demand" operation, in effect, bypassed the regulations governing commuter air carrier flights, primarily the requirement for an ATP-certificated pilot rather than one who held only a commercial certificate. It could not be determined if the counter agent who made the decision knew the intent of the regulations when he designated certain flights "extra section," "on-demand," or "charter." The agent held no FAA certificates and was not qualified to make operational decisions of this type on his own. Even though the regulations prohibit a pilot from accepting a flight for which he is not qualified, the Safety Board believes that a young, newly employed pilot, such as the accident pilot, may not have recognized the objective involved in the flight substitution and may have accepted the "on-demand" flight designation without questions or reservation.

The responsibility for assuring that flight operations are conducted in accordance with applicable regulations rests with the operations management of VAL and these operations decisions should not have been delegated to anyone without comprehensive guidance. The Safety Board noted that on the day of the accident, two other flights were flown as extra sections to Flights 301 and 302, respectively, and were designated by the company as "on demand" and "charter" flights. The Safety Board believes that the only reason these flights were designated in this manner was to justify using a non-ATP certificated pilot in lieu of an ATP-certificated pilot. Also, we believe that this practice may have been more wide spread than indicated by these examples, but because of the lack of standardization in the flight manifests examined, no pattern or clear cut examples could be established. Notwithstanding the lack of specific examples of the carrier's substituting "on demand" flights for scheduled commuter flights, the fact that three such operations occurred on the day of the accident, lends the Safety Board to believe that this was a common practice by VAL.

The practice of substituting "on demand" flights or extra sections in lieu of scheduled commuter flights, circumvented the intent of the regulations which prescribe a high standard of safety for commuter air carriers who provide scheduled commercial service to the traveling public. The Safety Board believes that the company's motivation for doing this was to gain operational/scheduling flexibility, to utilize non-ATP rated pilots; and to gain economic advantage, and that the practice did not result from a misunderstanding or an ambiguity in the regulations but rather from an opportunity to intrepret the regulations differently. Since a waiver of the use of ATP-certificated pilots was the central feature of Exemption 3479, the company management was well aware of the requirement of 14 CFR Part 135.243 and, therefore, should have implemented the prescribed procedures, directions, and training following the expiration of the exemption (December 31, 1983). The delegation of the authority to an unqualified counter agent, to designate flights as "on-demand," indicates a serious deficiency in the management of the

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company. Therefore, the Safety Board concludes that the failure of VAL management to exercise operational control to prevent operating Flight 901A as an "on demand" flight with an inexperienced pilot-in-command contributed directly to the cause of the accident.

According to company policy, the weight and balance computations are prepared by a counter agent subject to acceptance by the pilot-in-command in signing off. The practice of asking passengers their weight in lieu of actually weighing them is an accepted FAA-approved practice for some commuter air carriers. However, as illustrated by this case, the practice introduces a possibility of error which could significantly affect the weight and balance computations. Additionally, in this case, each passenger had switched assigned seats, according to the manifest, a practice which also could produce an out of CG condition.

Considering the most probable weights for onboard baggage and fuel along with the most probable passenger seating configuration, the Safety Board believes that the airplane most probably was about 600 to 700 pounds over its maximum certificated takeoff gross weight and that its CG was well aft of the aft limit. All of the evidence points to a flagrant and reckless disregard for weight and balance procedures and Federal regulations and a token effort on the part of those involved to comply with requirements on paper and not in practice. Four days after the accident, the FAA revised VAL's operations specifications to require VAL to use actual passenger weights instead of "asking the passenger directly" for their weight.

Additionally, the lack of any company procedures to verify flight times and other operational data submitted by pilots demonstrates a lack of managerial control. The disregard by some VAL pilots of the standard practice of checking for water in fuel by using a transparent container, and the disregard by the accident pilot to load passengers according to the Flight 901A manifest indicate a lack of training and standardization among VAL personnel as directed by VAL management. Based on the above discrepancies, the Safety Board concludes that VAL management in large part was ineffective and contributed to the cause of this accident.

2.4 FAA Surveillance of Vieques Air Link, Inc

FAA Order 8430.1C does not prescribe that a minimum number of inspections per operator be made, and there is no requirement to vary the types of inspections or the airports at which they are performed. During the 10-month period (October 1, 1983 to August 2, 1984) before the accident, the FAA conducted 72 inspections of VAL; 44 of which were a part of NATI. Twelve of the 24 ramp inspections were made at the Isla Grande, San Juan, Airport which is a short distance from the FSDO offices. The records available indicated that 27 operations and 17 maintenance inspections were accomplished during the NATI program. The FAA reported that 1 operations and 2 maintenance inspections of VAL during NATI were unsatisfactory. The detected discrepancies were not representative of the management problems uncovered at VAL during the Safety Board's investigation.

First, in viewing the type and frequency of various inspections of VAL, it was readily apparent that inspections of the commuter air carrier were numerous. The inspections mostly were operations type (line, ramp and en route) inspections and many of them were conducted during the NATI program in March 1984, at the same time that VAL was preparing to introduce into service the Mk III Trislander, the introduction of which the FAA was following closely.

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Within the scope of the investigation of this accident, the limited numbers of operations inspections in the areas of records, training, and manual procedures is of concern to the Safety Board. Moreover, there was no record that the FAA ever attended a VAL training session during the 10-month period before the accident. FAA personnel stated that they attended training sessions during the initial approval of the training manual and that they observed training sessions on a random basis, but thereafter they inspected the training function only if a problem arose.

Since the pilot had not submitted monthly flight time summaries for March and July 1984, and since there were inconsistencies between flight times reported in pilot records and those accounted for in the maintenance logs, the Safety Board encountered considerable difficulty in reconstructing the accident pilot's flight time history from the information available in the operations department. The recording of flight times and other operational information on a monthly basis was VAL's FAA-approved procedure. An accurate accounting of flight time is required by 14 CFR Part 135. The VAL practice of allowing pilots to submit monthly flight time summaries is ineffective as a means to determine accurately an individual's flight time history, even if kept current, and could introduce the possibility that individual pilots may exceed flight and crew duty-time limitations, especially where a large amount of off-schedule flying is conducted as was the case with VAL. Further, the introduction of the flight time summaries did not relieve VAL management of the responsibility to maintain accurate operational records. The Safety Board views the regulatory requirement to submit operational flight information monthly as too infrequent for accurate managerial reporting and recordkeeping. Accountability for the failure of VAL management to require timely submissions of flight time summaries must be shared by FAA, since the FAA should have detected the deficiencies during routine surveillance and should have provided the necessary corrective guidance to VAL or initiated enforcement action if corrective action was not forthcoming.

The same holds true in respect to the preparation of flight manifests. VAL's carelessness in the preparation of the manifests resulted in the Safety Board being unable to determine accurately the operational status of 43 flights in a 2-week period. Also, since a large number of employee's initials were used in the signature blocks, rather than signatures, it was difficult to determine readily who had prepared a manifest and who was the pilot-in-command of a flight. The overweight condition and the incorrectly listed baggage and fuel weights on the accident flight further indicated a lack of attention to the critical aspects of weight and balance preparation on the part of VAL counter agents. During its operations inspections, the FAA should have initiated enforcement action or noted that flight manifests were carelessly prepared and should have called this matter to VAL's attention. Further, the FAA should have called to VAL's attention that signatures are required by the regulation, not initials.

The FAA should have required VAL to prepare more specific ditching procedures in VAL's operations specifications for the BN-2A airplane considering the fact that a significant portion of VAL's flights are overwater. As a minimum requirement, the ditching procedure described in the Airman's Information Manual should be incorporated into the operations manual and taught during recurrent training.

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The fact that the passenger briefing cards found in the wreckage did not describe accurately the locations of specific emergency equipment is a violation of FAA regulations; FAA oversight failed to bring this important aspect of occupant survival to VAL's attention and to require corrective action. This discrepancy should have been noted during the FAA's numerous NATI program base inspections when the FAA was looking for proper distribution of the flotation devices to individual passengers. The Safety Board believes that had adequate attention been directed to the administrative aspects of operations procedures, the deficiencies in training, recordkeeping, and passenger safety would have surfaced and would have been corrected. Therefore, the Safety Board concludes that ineffective FAA surveillance contributed to the accident.

The Safety Board believes that the FAA acted correctly on August 17, 1983, in denying an extension and modification of exemption 3479 which would have allowed VAL to continue to operate commuter air carrier flights with commercial pilots even though they did not meet the 1,500-hour experience requirements of 14 CFR Part 61.155. The 2-year time period that exemption 3479 was in effect was sufficient time for VAL pilots to have obtained ATP certificates.

The Safety Board believes that there are ambiguities and misconceptions in the interpretations of the regulations as to the specific requirements of 14 CFR Part 135 applicable to commuter air carrier operations and on-demand type operations. The intent of these regulations was well understood by the FSDO; nevertheless, it did not seek definitive clarification of the rules prior to the accident flight or conduct effective surveillance to ensure that VAL did not alter the status of supplemental flights wherein commuter flights were designated on-demand flights. More effective surveillance along with the correct application of the rules would have remedied this ambiguity and would have allowed better standardization in implementing the regulations. Had that been accomplished, VAL would not have been allowed to conduct the amount of off-scheduled flying observed and would not have utilized pilots without ATP certificates to fly in a commuter air carrier operation.

The fact that local FAA personnel viewed the accident flight as an on-demand flight (until corrected by FAA headquarters) after the accident strongly suggests that VAL management's interpretation and application of the Part 135 rules was condoned by the FAA; however, there was no evidence to support this conclusion other then what actually occurred on the day of the accident.

Since FAA personnel told Safety Board investigators during the onscene phase of the investigation that it was acceptable to designate late flights as on-demand flights, the Safety Board believes that the FAA FSDO staff inspectors charged with surveilling VAL actually (1) applied 14 CFR Part 135 rules in that manner, and (2) did not closely scrutinize VAL operational flight designations, recordkeeping, and flight manifests. The Safety Board believes that had the FAA taken action to seek clarification to the rules and had the FAA applied the rules effectively through their surveillance activities, this accident might not have occurred. Since exemption 3479 (ATP pilot rules) expired on December 31, 1983, the FAA should have surveyed VAL more often than a single local operations inspection.

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The Safety Board's concerns about the handling and storage of fuel at airports and the need for specific standards for initial and recurrent training of fueling personnel were enunciated in a safety study 17/ and in safety recommendations 18/ that were issued as a result of the study. Although the study involved major airports certificated under 14 CFR Part 139, it is clear from the investigation of the accident that some of the problems also existed at the Vieques Airport, which is not a certificated airport. In response to the Safety Recommendations resulting from the study, the Administrator of the FAA stated that several alternatives addressing the fueling problems were under consideration, including a requirement to license refueling personnel or fueling agencies at all airports, not just at certificated airports. The Administrator indicated that the alternatives will be included in a Notice of Proposed Rulemaking (NPRM). The Safety Board believes that the fueling problem identified in this accident lends support for a proposal to license all fueling personnel or fueling agencies that dispense aviation fuel to the public.

3. CONCLUSIONS

3.1 Findings

1. Power was lost on the left engine following takeoff due to water in the fuel.

2. The pilot did not properly execute the emergency procedures for the loss of the left engine. Postaccident inspection indicated that the left propeller was not feathered and that the flaps were in the full DOWN position.

3. The pilot was a relatively inexperienced multi-engine pilot and only held a commercial pilot certificate.

4. The pilot's training on the BN-2A was minimal.

5. VAL Flight 901A, designated as an "on-demand" extra-section to a cancelled scheduled flight, actually was a scheduled commuter air carrier flight.

17/ Safety Study, Airport Certification and Operations, NTSB/SS-84/02, dated April 11, 1984.

18/ (A-84-25) Certificate fueling personnel at certificated airports. (Class III, Longer-Term Action); (A-84-26) Establish designated fueler certification examiners to ensure a uniform standard for fueling training, knowledge, and competence at certificated airports. (Class III, Longer-Term Action); (A-84-27) As an interim measure until a program for certificating fueling personnel can be established, revise the compliance criteria applicable to certificated airports in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to contain specific standards for initial and recurrent training of fueling personnel, which address methods of assuring fuel quality, fire prevention, vehicle inspection and operation, proper fueling techniques, and knowledge of airport operating rules. (Class II, Priority Action); and (A-84-28) Revise the compliance criteria in FAA Order 5280.5, "Handling and Storage of Hazardous Material," to incorporate detailed procedures for fuels storage area inspections and specific facility acceptability criteria. (Class II, Priority Action).

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6. The pilot was not certificated to fly as pilot-in-command of a commuter air carrier flight. The two previous flights flown by the pilot on the day of the accident also were commuter air carrier flights.

7. The company emergency ditching procedure for the BN-2A was inadequate.

8. VAL was not required to weigh each passenger. However, its estimates of individual passenger weights and recorded weights on the manifests differed significantly from the coroner's estimated body weights.

9. The passengers were not seated in their assigned seating positions according to the VAL passenger manifest.

10. The airplane's gross takeoff weight most probably exceeded the 6,000-pound maximum by 600 to 700 pounds. The center-of-gravity was most probably 5 inches aft of its rearmost limit.

11. The airplane struck the water in a steep nosedown and steep left-wing-low attitude.

12. Passengers struck the backs of seat rows 1, 2, and 3; and some or all of the contents of the baggage compartment struck the seat back of seat row 4.

13. Pilot compartment seats and the first two rows of passenger seats were crushed rearward about 12 feet. Passenger seat rows 2, 3, and 4 separated from the floor and were deformed forward and to the right.

14. The pilot and three passengers died instantly of multiple traumatic injuries at impact. Five passengers died as a result of drowning. They also received traumatic injuries.

15. Five of the 10 personal flotation devices reportedly on the airplane had deficiencies, such as mislabeled technical information, loose inflation cylinders, and leakage after inflation.

16. VAL's management of its operations was inadequate regarding operational recordkeeping, weight and balance procedures, and operational control.

17. VAL designated the accident flight and two earlier flights on the same day as "on-demand" flights knowing they in fact were commuter air carrier flights. VAL assigned a pilot to fly the accident flight who was not certificated to conduct the flight.

18. The FAA FSDO's interpretation and application of 14 CFR Part 135.243 was incorrect even though the intent was known and the FAA did not take action to seek clarification to the application of the rules until after the accident. FAA surveillance of VAL operations was ineffective.

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3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the pilot to execute the emergency engine-out procedure properly shortly after takeoff following a loss of power in the left engine because of water in the airplane's fuel system and the failure of the Puerto Rico Ports Authority to remove excess water known to be in the airport's in-ground fuel tank before conducting fueling operations. The pilot's failure to execute the engine-out procedure properly was due to his inexperience in multi-engine airplanes.

Contributing to the accident were: (1) the air carrier's use of a pilot not certificated for the flight; (2) the air carrier's failure to train the pilot adequately; (3) the pilot's failure to follow proper practices to detect water in the airplane's fuel tanks; (4) the out of weight and balance condition of the airplane; (5) the Federal Aviation Administration's (FAA) incorrect application of 14 CFR Part 135 Rules to commuter air carriers; and (6) the FAA's generally inadequate surveillance of the air carrier.

4. RECOMMENDATIONS

On April 15, 1985, the Safety Board recommended that the Federal Aviation Administration:

> Issue instructions to operations and maintenance inspectors to direct their respective air carriers to examine Eastern Aero Marine Model GA-12 flotation devices for security of inflation cylinders and proper Technical Standard Order labeling, to pressure test inflation chambers for leakage, and to require corrective actions where discrepancies are found during these examinations. (Class II, Priority Action) (A-85-28)
>
> Issue a telegraphic alert to suppliers and owners of the Eastern Aero Marine Model GA-12 flotation devices that these devices may be mislabled, that the CO_2 cylinders may be loose, and that they may not comply with TSO-C72b buoyancy and pressure test criteria; and advise suppliers and owners to have these devices overhauled in accordance with Eastern Aero Marine's Inspection, Maintenance and Repair Manual. (Class II, Priority Action) (A-85-29)
>
> Conduct a Quality Assurance and Surveillance Review Action of Easter Aero Marine to examine its design, manufacture, fabrication, testing, and quality control practices to ensure that its products conform to the governing Technical Standard Order criteria. (Class II, Priority Action) (A-85-30)

As a result of its investigation, the Safety Board made the following recommendations to the Federal Aviation Administration:

> Issue an Airworthiness Directive applicable to Pilatus Britten-Norman BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes requiring the incorporation of Britten Norman modification NB/M/350 to provide increased protection from fuel contamination. (Class II, Priority Action) (A-85-73)

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Amend the FAA's operations specifications applicable to Vieques Air Link, Inc., and other U.S. operators of Pilatus Britten-Norman BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes engaged in commuter/air taxi operations, to require that preflight checks for fuel contamination be made before the first flight of the day and after each refueling operation in strict accordance with the manufacturer's instructions. (Class II, Priority Action) (A-85-74)

Require Pilatus Britten-Norman to install a device to measure airplane attitude, e.g., a small bubble-level, on all BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes delivered in the United States in order to provide a ready means for ensuring the airplane is level during preflight checks for fuel contamination. Concurrently, require Britten-Norman to develop a service kit or modification instructions to retrofit existing BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes with a similar device. (Class II, Priority Action) (A-85-75)

Require Pilatus Britten-Norman to prepare and disseminate a Safety Advisory relating to water in the fuel to all operators of BN-2, BN-2A, BN-2B, BN-2T, and BN-2A Mk III model airplanes. The advisory, in addition to outlining the circumstances relating to the Vieques Air Link accident of August 2, 1984, and the criticality of proper preflight fuel tank drainage procedures, should urge operators to incorporate Britten-Norman Modification NB/M/350 in their airplanes. (Class II, Priority Action) (A-85-76)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G. H. PATRICK BURSLEY
Member

September 27, 1985

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5. APPENDIXES

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified of the accident about 0830 e.d.t. on August 2, 1984, and immediately dispatched an investigative team to the scene. Investigative groups were established for operations/air traffic control/weather, powerplants, structures and systems, and survival factors. A maintenance records group was convened on August 12, 1984, to examine the maintenance records.

Parties to the investigation were the Federal Aviation Administration, Vieques Air Link, Inc., and Puerto Rico Ports Authority.

2. Public Hearing

No public hearing was held; however, sworn testimony was taken from 10 individuals who were employees of the company (VAL) and the Puerto Rico Ports Authority (PRPA).

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APPENDIX B

PERSONNEL INFORMATION

Pilot

Captain A. Miguel Garcia, 21, was employed by Vieques Air Link (VAL) on March 18, 1984. According to his VAL individual pilot record dated March 18, 1984, he had 510 hours of flight experience in single engine airplanes and 6 hours in multi-engine airplanes. Subsequently, he accumulated a total of 71 hours in BN-2A twin engine Islander airplanes as pilot-in-command and 105 hours in BN-2A Mk III Trislander three-engine airplanes. He held a valid FAA Commerical Pilot Certificate, No. 583498740 date March 13, 1984, for airplane single and multi-engine land and instruments. Captain Garcia's FAA commercial, multi-engine and instrument ratings were issued on March 13, 1984. He held a valid FAA second class medical certificate with no limitations or waivers, which was issued on October 26, 1983.

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APPENDIX C

AIRPLANE INFORMATION

1. Airplane

The Britten-Norman BN-2A Islander is a 10-seat (1 or 2 pilots and 9 or 8 passengers, respectively) feederline transport airplane certificated under 14 CFR 23 (Utility Requirements). The airplane was manufactured at Bembridge Airport, Bembridge, Isle of Wight, PO35 5PR, in the United Kingdom-- Serial No. 38.

The BN-2A design is that of a cantilevered high-wing monoplane with a wing span of 49 feet and a maximum certificated gross weight of 6,000 pounds.

The seating arrangement is side-by-side front seating and four bench seats. There is no aisle. Access to all seats is via three forward opening doors, two aft on the left side of the fuselage and one on the right side of the fuselage. The baggage compartment access aft is on the left side of the fuselage.

2. Powerplants

The accident airplane was equipped with two Lycoming six-cylinder horizontally-opposed, piston normally aspirated, aircooled, reciprocating engines, Model O-540, which developed 260 shaft horsepower each. Each engine turned a Hartzell Model HC-2CYK-2CUF, 80-inch-diameter, two-bladed constant speed, full feathering propeller.

	Left Engine L-14403-40 S/N	Right Engine L-15658-40 S/N
Engines		
Total Operating Time Since New:	3,821.0	2,789.6
Total Time Since Overhaul:	1,973.1	792.8
Total Time Since Last Inspection:	18.9	18.9
Propellers		
Total Time Since Overhaul:	325.9	1,277.2
Total Time Since Last Inspection	18.9	18.9

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APPENDIX D

VAL PUBLISHED SCHEDULE

VIEQUES – SAN JUAN

Flight	Departure	Arrival
803	7:30 A.M.	8:00 A.M.*
805	8:55 A.M.	9:25 A.M.*
809	12:00 M.	12:30 P.M.*
811	2:30 P.M.	3:00 P.M.*
813	4:30 P.M.	5:00 P.M.*
815	5:46 P.M.	6:15 P.M.*

*Daily

SAN JUAN – VIEQUES

Flight	Departure	Arrival
802	6:30 A.M.	7:00 A.M.*
804	8:15 A.M.	8:45 A.M.*
806	9:30 A.M.	10:00 A.M.*
810	12:45 P.M.	1:15 P.M.*
812	3:15 P.M.	3:45 P.M.*
814	5:15 P.M.	5:45 P.M.*

*Daily

VIEQUES – SAN JUAN (ISLA GRANDE)
IDA / ONE WAY $ 23.00
ROUND TRIP $ 46.00

VIEQUES – FAJARDO

Flight	Departure	Arrival
301	7:00 A. M.	7:10 A. M.*
303	9:00 A. M.	9:10 A. M.*
307	12:00 M.	12:10 P. M.*
309	2:30 P. M.	2:40 P. M.*
311	3:30 P. M.	3:40 P. M.*
313	5:00 P. M..	5:10 P. M.*

FAJARDO – VIEQUES

Flight	Departure	Arrival
302	7:15 A. M.	7:25 A. M.*
304	9:45 A. M.	9:55 A. M.*
308	1:00 P. M.	1:10 P. M.*
312	4:00 P. M.	4:10 P. M.*
314	5:30 P. M.	5:40 P. M.*

VIEQUES – FAJARDO
IDA / ONE WAY $11.00
ROUND TRIP $ 22.00

FAJARDO – ST. THOMAS

Flight	Departure	Arrival
502	8:30 A. M.	8:50 A. M.*
506	3:00 P. M.	3:30 P. M.*

ST. THOMAS – FAJARDO

Flight	Departure	Arrival
503	9:15 A. M.	9:35 A. M.*
509	4:00 P. M.	4:20 P. M.*

* Daily

FAJARDO – ST. THOMAS
IDA / ONE WAY $ 23.00
ROUND TRIP $ 45.00

VIEQUES – ST. CROIX

Flight	Departure	Arrival
901	7:30 A.M.	8:00 A.M.*
905	2:45 P.M.	3:15 P.M.*
909	12:00 M.	12:30 P.M.**
911	2:00 P.M.	2:30 P.M.**

*Daily Except Sunday
**Sunday Only

ST. CROIX – VIEQUES

Flight	Departure	Arrival
902	8:15 A.M.	8:45 A.M.*
908	3:30 P.M.	4:00 P.M.*
910	1:00 P.M.	1:30 P.M.**
912	3:00 P.M.	3:30 P.M.**

*Daily Except Sunday
**Sunday Only

VIEQUES ST. CROIX
IDA / ONE WAY $ 25.00
ROUND TRIP $ 50.00

VIEQUES – HUMACAO

Flight	Departure	Arrival
701	7:30 A.M.	7:40 A.M.*
707	4:00 P.M.	4:10 P.M.*

*Daily Except Saturday & Sunday

HUMACAO – VIEQUES

Flight	Departure	Arrival
702	8:00 A.M.	8:10 A.M.*
708	4:30 P.M.	4:40 P.M.*

*Daily Except Saturday & Sunday

VIEQUES – HUMACAO
IDA / ONE WAY $ 18.00
ROUND TRIP $ 36.00

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APPENDIX E

PUERTO RICO PORTS AUTHORITY AT VIEQUES, PUERTO RICO

The No. 1 tank was installed in July 1968. The No. 2 tank was installed in June 1975. The Puerto Rico Ports Authority (PRPA) contractor's procurement drawing called for the end of the 4-inch-diameter suction pipe to be installed at a height 6 inches above the bottom of the tank and at an elevation the same as that of the end of the suction pipe of the No. 1 tank. The drawing called for the suction pipe to be installed in or near the south end of the tank, but no person or record could be found at the PRPA to indicate the exact location in which the suction pipe actually was installed in both tanks. The manufacturing sketch for the No. 1 tank did not indicate the exact position or height of the end of the suction pipe from the bottom of the tank. The manufacturing installation sketch for the No. 2 tank indicated that the suction pipe was installed in the center of the tank.

If the height of the end of the suction pipe, as indicated in the drawing actually was 6 inches above the bottom of the No. 2 tank, then the volume of liquid in the segment below the end of the pipe by arithmetical calculation would be 288 U.S. gallons.

The length of the No. 1 tank was reported to be 18 feet, but the tank would have to be 24 feet long for its capacity to be 5,000 U.S. gallons; on the assumption its diameter was 72 inches, the tank is shown in figure 1 to be 24 feet long.

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PART IV - FUEL AND FLAMMABLE MATERIALS

4.1 USE OF FLAMMABLE VOLATILE LIQUIDS - No person shall use volatile liquids having a flash point of less than 100 degrees Fahrenheit in the cleaning of aircraft, its engines, propellers, fixtures, or for any other purpose, unless such operations are conducted in open air, or in a confine specifically set aside and approved for that purpose; which confine must be properly fireproofed and equipped with adequate and readily accessible fire extinguishing devices.

The procedures and precautions outlined in the standards of the National Fire Protection Association (NFPA Pamphlet No. 410D, Safeguarding, Aircraft Cleaning, Painting and Paint Removal and NFPA Pamphlet No. 410F, Aircraft Cabin Cleaning and Refurbishing Operations), will be adhered to in all cleaning, painting and refurbishing operations using flammable fluids including the storage of said fluids.

4.2 STORAGE - Fuels, lubricants or other flammable or dangerous materials shall not be stored on apron areas or ramps.

4.3 FUELING OPERATIONS - All aviation fuel shall be dispensed on airport property only by concessionaires having a contract with the Authority for aeronautical purposes and holding a permit issued by the Director of Aviation and approved by the Executive Director.

No company or individual shall be allowed to transport flammable liquids within aircraft apron areas or to refuel aircraft on any portion of the property owned and operated by the Ports Authority, prior to the securing from the Director of Aviation, duly approved by the Executive Director, a Class A, Class B or Class C permit.

Permits shall be issued for the need of the service and/or at the convenience of the Authority and may be canceled when the Executive Director deems it convenient to safeguard public interest.

Application for a permit shall be made to the Director of Aviation or his representative.

The recipient of a fueling permit issued by the Executive Director on the recommendation of the Director of Aviation shall adhere to the stipulations set forth on said permit and shall abide by these Rules and Regulations pertaining to fueling operations; otherwise, the permit shall be canceled.

4.4 CLASS A PERMIT - Each holder of a Class A permit may operate mobile refueling equipment in the air operation areas. The mechanical equipment used must at all times satisfy all safety regulations and requirements of applicable safety codes. Mobile refueling equipment shall not be deemed to include tank trucks unless specifically authorized by the Executive Director on the recommendation of the Director of Aviation.

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4.5 CLASS B PERMIT - Each holder of a Class B permit may service aircraft belonging to the general flying public only at a specific location in the Airport. The fuel installation site must be approved by the Director of Aviation or his representative and the installation of all equipment shall comply with all Federal, Commonwealth and Airport Rules and safety codes. A holder of a Class B permit shall not operate mobile refueling equipment at the airports.

4.6 CLASS C PERMIT - Each holder of a Class C permit may service and maintain his own aircraft or any aircraft which he leases or operates and may use his own personnel to perform this service and maintenance work.

4.7 FUELING AND DEFUELING AIRCRAFT - When any spill of fuel, oils, lubricants or any other chemical occurs, the affected area shall be washed immediately by the person supplying the fuel or by Ports Authority personnel for the account of the vendor that fuels the aircraft.

The following general rules shall govern the fueling, lubrication service and sumping of aircraft, the placing of fuel in storage tanks or dispensers:

a. No aircraft shall be fueled, defueled or lubricated while in motion or while such aircraft is in a hanger or a congested or enclosed space.

b. It shall be strictly forbidden to smoke in air operation areas. It shall be forbidden to start a fire or open

flame without the express consent of the Director of Aviation or his representative. Once authorization is received, necessary precautionary measures shall be taken to maintain same under absolute control.

c. Prior to the fuel servicing of any aircraft, it and the fuel dispensing equipment shall be grounded to a point or points of zero electrical potential in the order indicated below and when completed, in the reverse order to prevent the possibility of static ignition of volatile liquids.

(1) Aircraft to apron or ground

(2) Refueling unit to ground

(3) Refueling unit to aircraft

(4) Refueling nozzle to aircraft

d. When malfunction of fueling equipment is detected all fueling shall cease immediately and the malfunction remedied or entire unit replaced by another. Any malfunctions or irregularity detected on or within the aircraft being serviced will be brought to the attention of the aircraft owner or operator immediately.

e. Crews engaged in the fueling and defueling of aircraft, the filling of dispensing equipment, or dumping into storage the aviation fuel shall exercise extreme caution to prevent spills.

f. All of the equipment used for fueling, defueling, sumping and dumping into storage of aviation fuel and lubricants shall be kept in optimum working conditions. This shall exclude fire extinguishing equipment.

g. The fuel vendor, during any fuel handling operation, shall keep on hand not less than two CO_2 or dry Chemical fire extinguishers (15 lbs. or larger).

h. During an electrical storm within a three (3)-mile radius of the air operations area, or while weather conditions do not permit it, no fuel handling operations shall be allowed.

i. During aircraft fueling or defueling no passenger shall remain on board, unless prior written consent has been obtai from the Airport Manager and provided that there is a cabin employee at the entrance door and a passenger stepladder properly placed, in case they should become necessary for a speedy disembarkation.

4.8 STORAGE IN AIRCRAFT APRON AREA

Fuel and/or lubricants shall not be stored above ground at distances of less than one hundred (100) feet from an aircraft apron or structure.

4.9 HANDLING OF FLAMMABLE VOLATILE LIQUIDS - The transportation, use or storage of flammable volatile liquids having a flash point of less than 38 degrees centigrade is prohibited, unless such operations are conducted in a confine specifically set

aside and approved for said purpose by the Airport Manager, which confine must be properly fireproofed and equipped with adequate and readily accessible fire extinguishing apparatus.

4.10 EXPLOSIVES AND OTHER DANGEROUS ITEMS - No person shall store, keep, handle, use, dispense or transport at, in or within the airport any Class A or Class B explosives (as defined in the Interstate Commerce Commission Regulations - which are incorporated herein for the purposes of this Part 4 - for transportation of explosives and other dangerous articles), or any Class A poison (as defined in Interstate Commerce Commission Regulations for transportation of explosives and other dangerous items), or any other poisonous substances, liquids or gas, any compressed gas, or any radioactive item, substance or material, at such time or place or in such manner or condition as to endanger unreasonably or as to be likely to endanger unreasonably persons or property.

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APPENDIX F

18 de mayo de 1981

DEPARTAMENTO DE AVIACION
CIRCULAR ADMINISTRATIVA
NUM. 65

ASUNTO: NIVEL DE AGUA EN TANQUES DE COMBUSTIBLE

Todos los días laborables los gerentes de aeropuertos se asegurarán que se tome la medida de los tanques de combustible para conocer el inventario físico y el nivel de agua de los mismos.

Dichas medidas se tomarán a las 8:00 a. m. y antes del primer despacho de combustible del día.

Para verificar el nivel de agua (excepto tanques del sistema AQUA del Aeropuerto Boriquen) se usará la pasta para este propósito conocida como "Water Finaing Paste". El nivel de agua se mantendrá al mínimo, debiéndose extraer el máximo de agua posible cada vez que la medida de vara o cinta refleje una pulgada (1") o más de agua.

Francisco J. Rovira
Director de Aviación

Aviation Department

Administrative Circular #65

Re: Water Level on the Combustible Tank

Every working day all airport supervisors will assure to take the measure of every combustible tank to know the physical inventory of the water level of them.

All measures shall be taken at 8:00 am and before the first ~~day of~~ combustible delivery.

To verify the water level (except for tank system Aqua Airport Boriquen) must use paste, for this purpose, ~~knowing~~ as "Water Finaing Past". The water level shall be kept at a minimum, the maximum of water possible must be taken out each time that the measure tape shows 1 inch or more of water.

Francisco J. Rovina
Aviation Director

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23 de noviembre de 1981

DEPARTAMENTO DE AVIACION
CIRCULAR ADMINISTRATIVA
NUM. 66

ASUNTO: SISTEMA DE FILTRACION EN FACILIDADES PARA DESPACHO COMBUSTIBLE DE AVIACION

Por este medio se instruye al personal de los Aeropuertos Vieques, Mercedita, Mayaguez, Arecibo y Fajardo para que se cumpla con lo siguiente:

1. Antes del primer despacho del día se drenará de agua el filtro/separador instalado en la bomba de despacho.

2. Se rotulará con estarcido visible al público la fecha en que fue instalado el elemento ("cartridge") en uso y se notificará por escrito de dicha fecha a la Oficina de Aeropuertos Regionales.

3. Los elementos de sistemas de filtración y separador de agua serán remplazados cada doce (12) meses y/o antes, de así ser requerido.

Espero se dé fiel cumplimiento a esta circular.

Francisco J. Rovira
Director de Aviación

Aviation Department

Memorandum From Administration #66

Re: Filtration System and facilitate for delivery of aviation combustible

This is to inform the airport staff of Vieques, Mercedita, Mayaquez, Arecibe and Fajardo to comply with the following:

1. Before the first delivery of the day you must drain the water filter/separator installed in the delivery pump.

2. Labeling with stencil, to be seen by the public, the date in which the element in use was installed (cartridge), and notify in writing the date to the Regional Airport Office.

3. The water system element of drain and separator will be replaced every 12 months and/or before, see requested.

I expect fulfillment of this memorandum.

Francisco J. Rovira
Aviation Director

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APPENDIX G

FAA EMERGENCY REVOCATION ORDER

US Department of Transportation
Federal Aviation Administration

Southern Region

P. O. Box 20636
Atlanta, Georgia 30320

HAND DELIVERED

JUN 25 1985

8550610036

Vieques Air Link, Inc.
Post Office Box 487
Vieques, Puerto Rico 00765

EMERGENCY ORDER OF REVOCATION

The following constitutes an Emergency Order of Revocation:

1. At all times material herein Vieques Air Link, Inc. was and is the holder of Air Taxi/Commercial Operator (ATCO) Certificate No. AT761-57.

2. On or about August 2, 1984, Vieques Air Link, Inc. operated civil aircraft N589SA, a Britten-Norman Islander (BN-2A), on a passenger carrying commuter flight identified as VAL Flight 901A from Vieques, Puerto Rico with an intended destination of St. Croix, U.S. Virgin Islands.

3. The above described flight terminated in a crash landing into the ocean approximately one-half mile north of Vieques Airport killing the pilot and all eight passengers.

4. Vieques Air Link, Inc. is a commuter air carrier and the aircraft described above is a multi-engine land airplane.

5. On the above described flight, Vieques Air Link, Inc. used the services of a pilot as pilot-in-command in passenger carrying commuter operations when the pilot was not the holder of an airline transport pilot certificate.

6. On the above flight the aircraft was knowingly operated by Vieques Air Link, Inc. in excess of the maximum allowable gross weight of the aircraft and with the aircraft's actual center of gravity to the rear of the aft center of gravity limit.

7. In computing the weight and balance for the aircraft, Vieques Air Link, Inc. failed to use the actual weights for passengers and their baggage as required by its operations specifications.

8. After the crash referred to above, Vieques Air Link officers and employees conspired to and did, in fact, prepare a knowingly false flight manifest, a record required to be kept by the Administrator,

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and presented the fraudulent manifest to the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) investigators who were investigating the crash.

9. By reason of the foregoing, Vieques Air Link, Inc. has demonstrated that it lacks the qualifications necessary to be the holder of an air carrier operating certificate issued by the Federal Aviation Administration.

As a result of the foregoing, Vieques Air Link violated the following sections of the Federal Aviation Regulations:

1. Section 135.243(a) in that Vieques Air Link, Inc., a commuter air carrier, used the services of a pilot, as pilot-in-command, in passenger carrying commuter operations on a multi-engine aircraft when he was not the holder of an airline transport pilot certificate with appropriate category and class ratings.

2. Section 135.63(c) in that Vieques Air Link, Inc. failed to make available to the Administrator an accurate and true load manifest for the above described flight.

3. Section 135.5 in that Vieques Air Link, Inc. operated an aircraft under Part 135 of the Federal Aviation Regulations contrary to and in violation of its operations specifications.

4. Section 91.31 in that Vieques Air Link, Inc. operated a civil aircraft without complying with the weight and balance limitations found in the aircraft flight manual.

5. Section 91.9 in that the facts and circumstances described above amount to careless and reckless behavior which endangered the lives and property of others.

6. Section 610(a)(4) of the Federal Aviation Act of 1958 [49 USC §1430(a)] in that Vieques Air Link conducted operations as an air carrier in violation of its certificate and operations specifications.

As a result of the foregoing, the Administrator has determined that safety in air commerce and the public interest requires the revocation of your air carrier operating certificate. The Administrator further finds that an emergency requiring immediate action exists in respect to safety in air commerce and, accordingly, this Order shall be effective immediately.

NOW, THEREFORE, IT IS ORDERED, pursuant to the authority vested in the Administrator by Sections 609(a) and 1005(a) of the Federal Aviation Act of 1958, that your Air Carrier Operating Certificate No. AT761-57 be, and hereby is, revoked. It is further ordered that said certificate be surrendered to the Manager of the San Juan Flight Standards District Office or his designee immediately.

You may appeal from this Order in accordance with the paragraph below.

R. R. HAGADONE
REGIONAL COUNSEL

BY: HERSCHEL H. MAHLEN, JR.
Attorney

APPEAL

You may appeal from this Order within ten days from the date it is served by filing a Notice of Appeal with the Office of the Administrative Law Judges, National Transportation Safety Board, Washington, D.C. 20594. However, due to the fact that your air carrier operating certificate has been revoked on an emergency basis, the revocation will remain in effect during the pendency of any proceedings before the National Transportation Safety Board. Part 821 of the Board's Rules of Practice applies to such an appeal. In the event you appeal, a duplicate of your Notice of Appeal should be furnished this office.

Whether or not you choose to appeal from the provisions of this order, you must surrender Air Carrier Operating Certificate No. AT761-57 to the Manager of the San Juan Flight Standards District Office or his designee.

In the event of an appeal to the NTSB, a copy of this order will be filed with the NTSB and will serve as the Administrator's complaint.

•U.S. GOVERNMENT PRINTING OFFICE: 1985-491-093:20055

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